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PIPE LINE INDUSTRY

OCTOBER
1957

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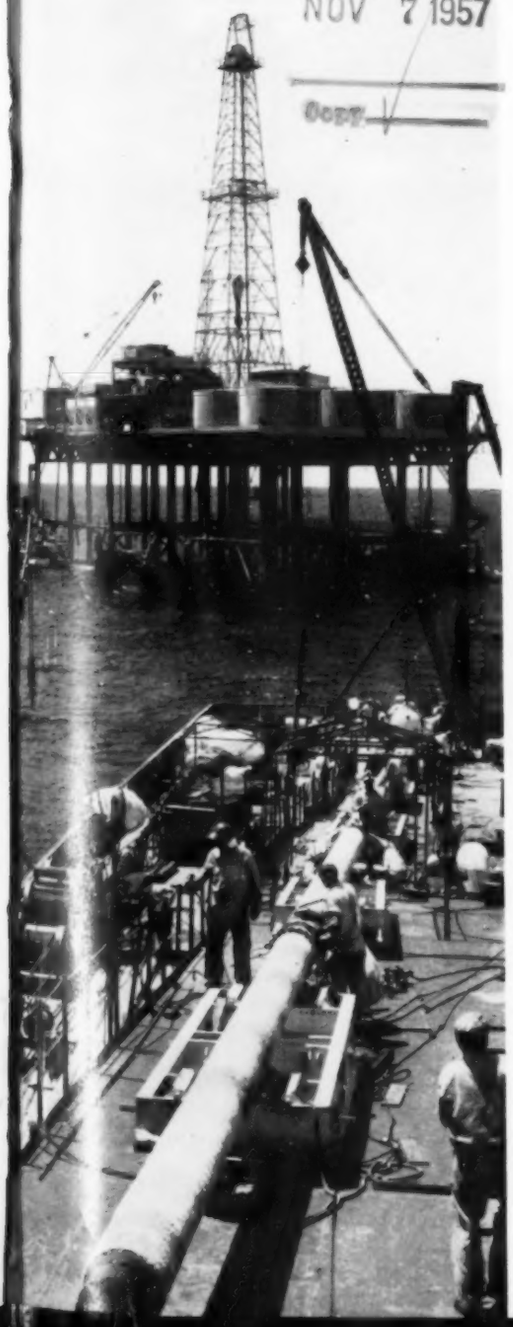

OFFSHORE DEVELOPMENTS 30

Ramp Barge Lays Mile-a-Day

Bottom Surveys Hold Line Steady

350-Foot Stinger Puts Pipe to Bed

EFFICIENT OPERATIONS

Blow-Case Eases Gager's Chores . . . 47

SAFETY ECONOMICS

Make the Graded Risk Pay Off 50

PLANNED TRAINING

Know What You Want to Teach . . . 54

For a "Quick Look" at this issue, turn the page . .

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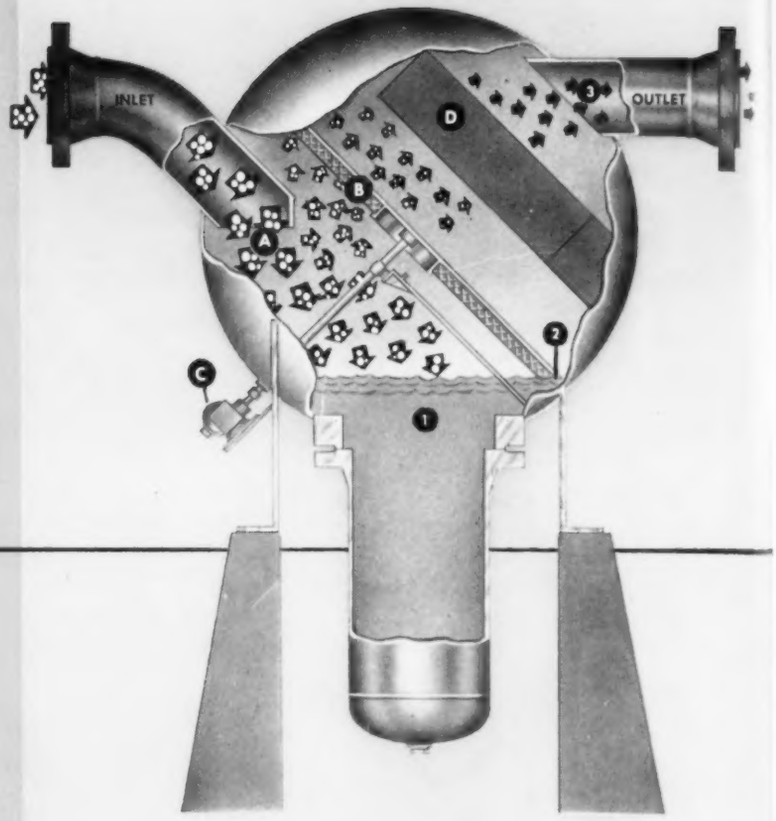
PEERLESS SCRUBOSPHERE*

*Spherical scrubber for dust and liquid removal from gas flow

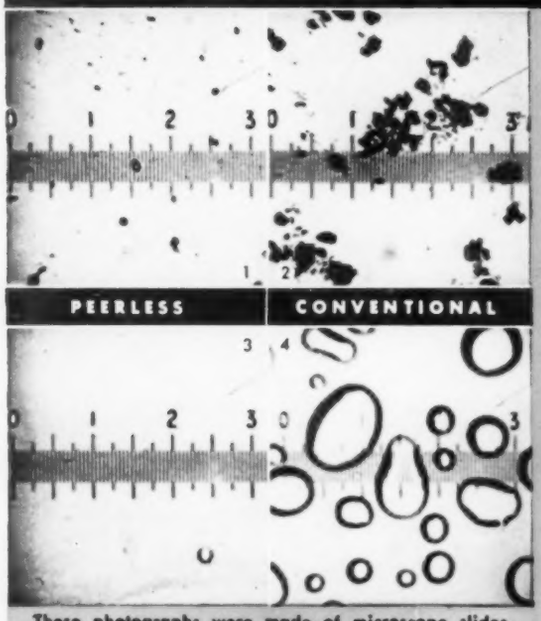


(A) The majority of incoming liquid and solid particles are directed down into reservoir. 1

(B) Lighter solid particles carried by gas stream are separated on surfaces of contactor which are kept wet and clean by revolving through liquid reservoir. 2

(C) Contactor is revolved by explosion-proof gear motor.

(D) Mist Extractor removes any remaining liquid particles from gas stream prior to outlet. 3



These photographs were made of microscope slides introduced downstream of the Scrubosphere and a conventional vertical oil bath cleaner under the same operating conditions. Plates 1 and 2 show the comparative amounts of iron oxide not removed with the amounts introduced being identical. Plates 3 and 4 indicate comparative oil loss with vapor rate through the vessels being the same.

LOOK AT THIS TEST The test at the left indicates the superiority of Peerless Scrubosphere over conventional oil bath dust scrubbers. The SCRUBOSPHERE operates with no loss of efficiency at low flows, minimum liquid loss, and very low pressure drop. Other outstanding features include easy vessel access with removable self-cleaning contactor, a sump for slugs of solid or liquid particles, and minimum cost.

For detailed information write for Bulletin No. 181

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MANUFACTURING CO.

P.O. Box 13165 Dallas, Texas

Representatives in All Principal Cities

PEERLESS MFG. CO.
DALLAS TEXAS

OCT 17 1957 B 676955 B 676955

PIPE LINE INDUSTRY

CONTENTS and Quick Look

October, 1957 Vol. 7, No. 4

To help you put first things first, scan these time-saving digests, checking ☑ those you want to read first.

OFFSHORE DEVELOPMENTS

New Barge Pushes Pipelaying Seaward

☐ Additions to the offshore pipe line fleet have introduced a number of advancements in laying of large submarine lines this summer. Air conditioned living quarters aboard Marine Gathering Company's lay barge *Magic* make for efficient around-the-clock work. Its 260-foot inclined working ramp located on the centerline leads pipe into the water with a smooth overbend in waters as deep as 100 feet and more.

By Melvin A. Judah.....Page 30

TGT Takes Steps to Prevent Hurricane Damage

☐ During the past two years, tropical storms have shown their effects on pipelining in coastal marshes and the Gulf of Mexico. Here is a report on the valuable data Tennessee Gas Transmission engineers obtained from studies of bottom sediments, waves, currents, and tides before they laid their new line from Grand Chenier, La., to CATC platforms 25 miles offshore.

By John C. Freeman.....Page 37

Advanced Designs Featured on New Barge

☐ New design features on lay barge constructing TGT's Kinder-CATC line herald development of marine construction barges of the future. This 1250-ton, 300-foot barge easily handles the 26-inch pipe being laid. Pipe is being laid at 2500 feet a day.

By John C. Watts.....Page 43

Blow-Case Eases Work for Gagers

☐ Here is a good method of cleaning stagnant high pour point oil from flow lines before new oil can be run. Interstate Oil Pipe Line Company designed a blow-case which will save both time and money in fields where this type oil must be handled.....Page 47

Fire Fighting Fundamentals—Using the Graded Risk

☐ Although it cannot be considered where possible human injury is involved, there are many places where the graded risk can be applied to cut fire protection costs. These practical ideas will help you to predict payouts.

By J. L. Risinger.....Page 50

Four Steps to Successful Training (Part 2)

☐ The purpose of any training effort is to create a desired attitude and skill among employes. In this analysis of 50 oil company training programs you will find more answers to the four most important questions to be considered with setting up a training program. Check to see how these suggestions fit in with your present program.

By Carl Mullins White.....Page 54

Facts About Pump Packings and Seals (Part 5)

☐ In this concluding installment of a complete packing and seal report you will find a wealth of handy tips for removing and installing packing. Follow them to insure a good seal of centrifugal pump shafts. A checklist points out most packing troubles, their causes and cures.

By Harold Woodhouse.....Page 58

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NEXT MONTH: Pipe Line Industry's Special Automation Issue

PIPE LINE INDUSTRY published every month. Entered as second class mail matter July 9, 1954, at the post office at Houston, Texas, under the act of March 3, 1879.

a matter of pride

EVERY YEAR about this time we like to remind our readers that PIPE LINE INDUSTRY is one of 11 oil industry publications (there are about 30 in all) which are allowed to carry the symbol of the Audit Bureau of Circulations.

"What's so important about belonging to ABC?" you may ask. The answer lies in the a-b-c's of business publication philosophy:

A. To keep from charging you about $20 a year for one PIPE LINE INDUSTRY subscription (compared with our present rate of $2 per year), we must have advertisers.

B. To have advertisers, we must attract enough of the right type of subscribers. The right type are those high enough in their company to influence the purchase of equipment and supplies.

C. And, to attract enough of the right type of subscribers, we must provide a high quality editorial service to our readers.

This is where the Audit Bureau of Circulations comes in. The Bureau sets standards for the definition and measurement of paid circulation, verifies adherence to those standards by its publisher members and disseminates circulation reports.

These up-to-date, audited reports help advertisers to exercise correct judgment in deciding which publications will give them the most for their advertising dollar.

When you see the ABC symbol in a publication (on Page 7 of this issue) it means that you, the reader, are the boss. And the editors know it. When we study our ABC audit report we find out in a hurry if we are earning our keep, i.e., maintaining a growing list of satisfied subscribers. This, plus increased advertising sales, is the ultimate reward for editorial initiative and leadership.

In turn, ABC circulation reports tell our advertisers what types of men, and how many, have selected PIPE LINE INDUSTRY to keep them abreast of the economic and technical developments in the pipe line field. To justify this selection, we must demonstrate responsiveness and a responsibility to our readers. Otherwise, we would be on the outside of ABC—and your paid subscription—wishing we could get in.

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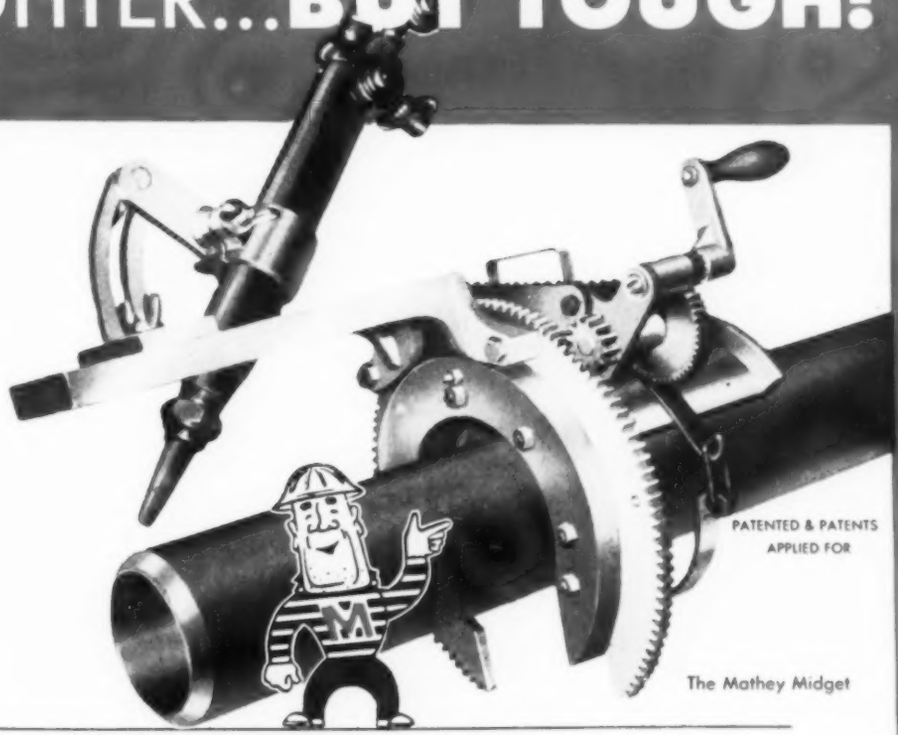

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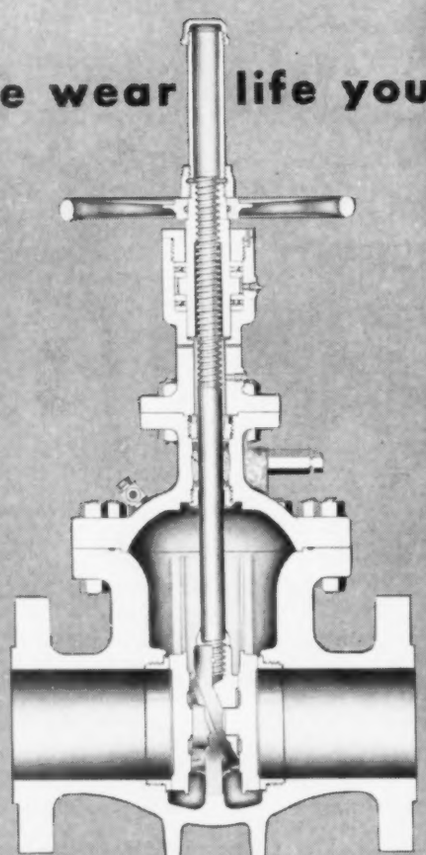

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Available in sizes 4 to 24 inches; flanged ends (No. 1680) or butt-welding ends (No. 1681). Either spur or bevel gearing can be provided. For full details, see your local Crane Representative or write to address below.

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This new Crane valve design has free-to-rotate double discs—hung independently to change seating position with every operation. Each time this valve is opened or closed, both discs are free to turn to provide cleaning action on seating contact areas, and thus prevent abrasive materials from collecting.

Disc clearances are always accurate, because the two identical discs move up and down in machined body-guide ribs—which take the service abuse usually forced on disc faces in conventional double-disc gate valves, a frequent cause of damage and costly maintenance.

Consider and compare, too, the perfect disc alignment in this smooth-working Crane pipeline valve. Annular-shaped machined wedging surfaces keep both discs and the body ring seat faces lined up at all times—and, in addition, compensate for any slight body deflections caused by line strains.

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WORLD OIL and THE COMPOSITE CATALOG for the drilling-producing-pipe line industry.

PETROLEUM REFINER and THE REFINERY CATALOG for the refining-natural gasoline-petrochemical industry.

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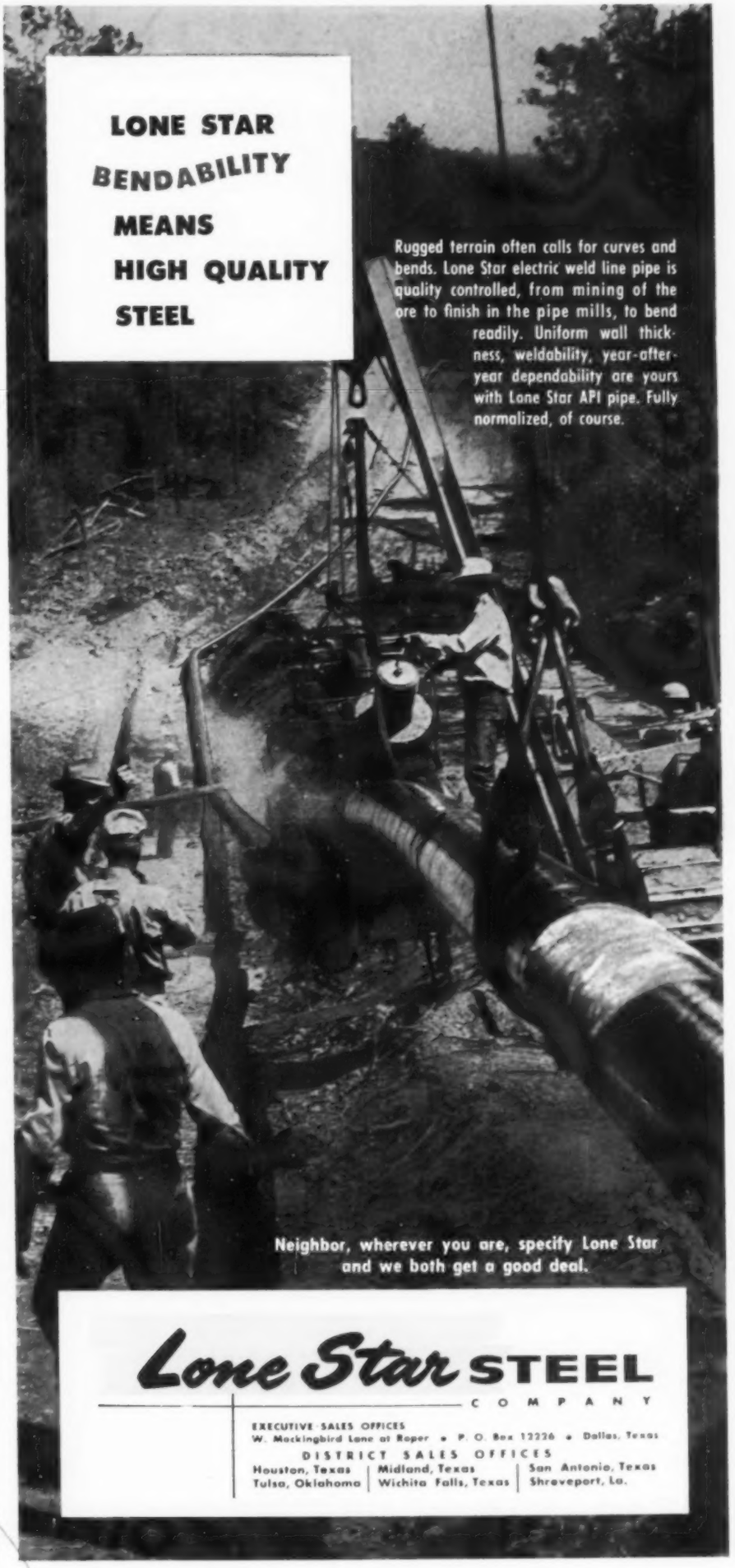
Indexed by Engineering Index and Industrial Arts Index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Let's get technical about WALWORTH LUBRICATED PLUG VALVES for pipeline service

Combination button-head lubricant fitting and lubricant screw is provided at no extra cost. Valves can be lubricated with a Walworth High Pressure Lubricant Gun without removing the screw . . . little chance of grit getting into the valve. (Always use Walworth Lubricants with Walworth Lubricated Plug Valves.)

An added safety feature in the form of a groove cut part way up side of the lubricant-fitting screw allows the operator to observe any tendency of lubricant to blow out *before* the screw is removed entirely.

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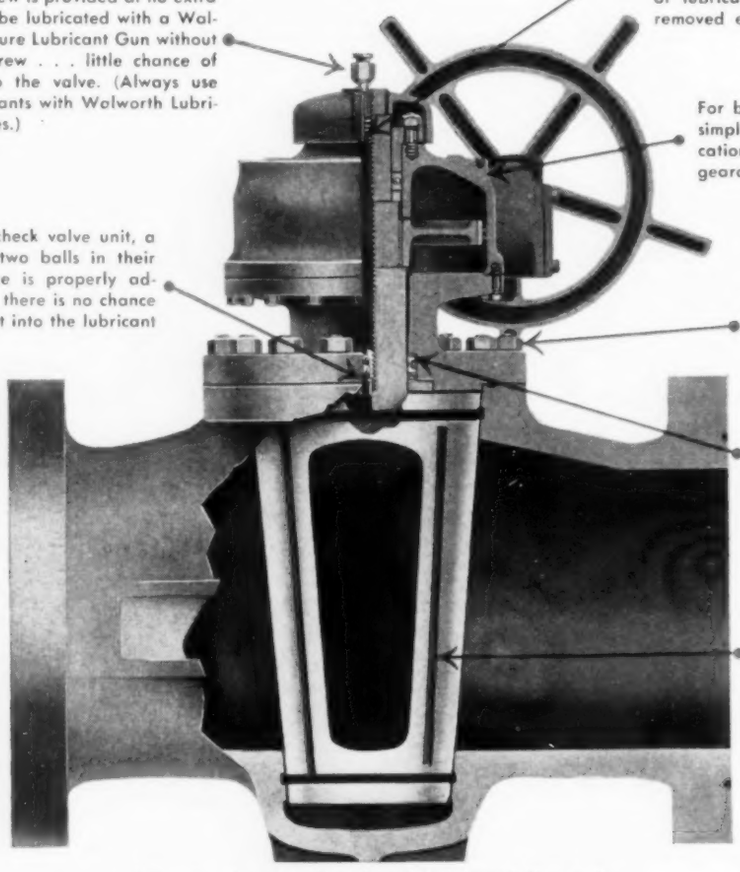
In the stainless steel check valve unit, a transverse pin holds two balls in their seats. When the valve is properly adjusted and lubricated, there is no chance for line pressure to get into the lubricant system.



Standard bolt threads, rather than fine threads, mean easy replacement of nuts and bolts from local stocks.

Two overlapping Teflon packing rings form an effective seal against possible leakage without "grabbing" the plug shank. Low breakout torque . . . plug turns easier. Packing serves only as a seal and is not used to hold the plug in its seat.

Lubricant grooves completely frame the port openings and encircle the plug at the top and bottom assuring a tight seal against leaks. Bottom circumferential groove is separate from, but connected with, the lubricant well.

Other Walworth Lubricated Plug Valves include Single Gland and Regular Gland types. Sizes to 30 inches. Pressures to 5000 psi. and for vacuum service.

Cutaway of a 24-inch Walworth Lubricated Plug Valve

Without exception, a Walworth Ball Bearing Lubricated Plug Valve is easier to operate and maintain than any other type of rotary-action, sealed valve available today for pipeline service. Design features pointed out here show just a few advantages of Walworth Ball Bearing Lubricated Plug Valves.

Many pipeline companies throughout the world use Walworth valves for handling gas, crude, and finished products. Investigate the line of Walworth valves for your own needs. See your Walworth Distributor, or write for literature: Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.

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For additional information, ask your Midwest distributor or write us for Catalog 54.

*Size 24" and smaller have tangents equal to ¼ nominal pipe size; for example, 12" ell has 3" straight ends. Above 24" pipe size, all tangents are 6" long.

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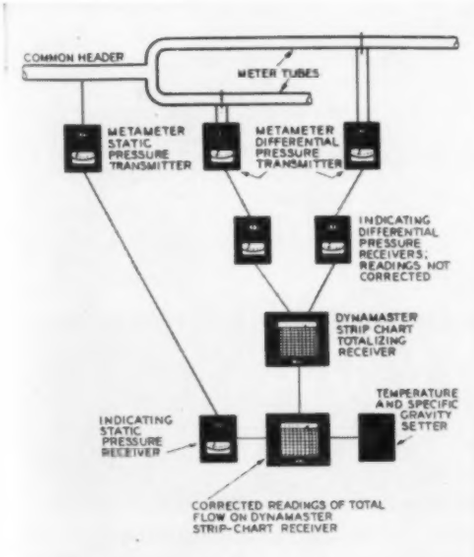
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METAMETER DIFFERENTIAL PRESSURE TRANSMITTER
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7-24

BRISTOL TRAIL-BLAZERS IN PROCESS AUTOMATION

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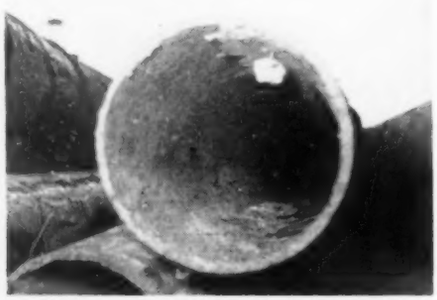
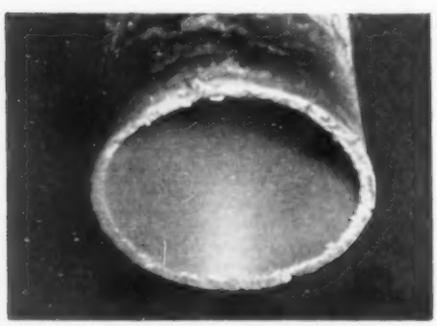
KONTOL-clean lines require less frequent scrapings and eliminate the need for higher pump pressures (and higher maintenance costs) in order to maintain pumping efficiency. The use of Kontol 77 eliminates contamination and discoloration caused by the products of corrosion.

HERE'S DRAMATIC PROOF OF KONTOL 77 EFFECTIVENESS



BEFORE KONTOL 77. This untreated, corrosion-clogged pipe shows heavy "moss" growth and scaling.



AFTER KONTOL 77. The smooth interior surface of this Kontol-treated pipe means improved "C" factor, restored throughput.

KPL-57-3

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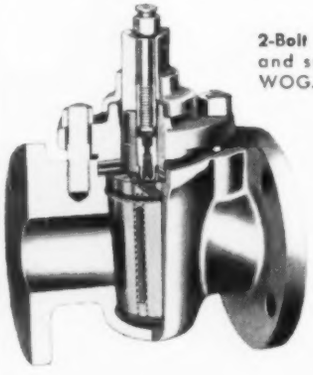
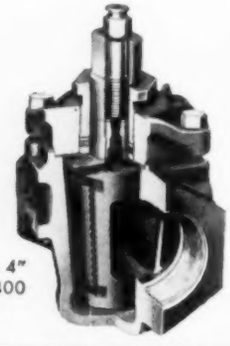
LUBRICANTS and

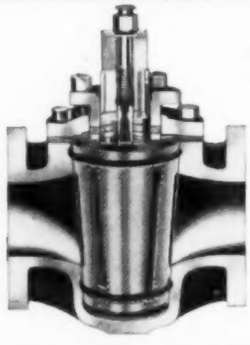
VALVES



2-Bolt Cover Type Valve in 4" and smaller sizes for 175-lb WOG. *Semi-Steel*

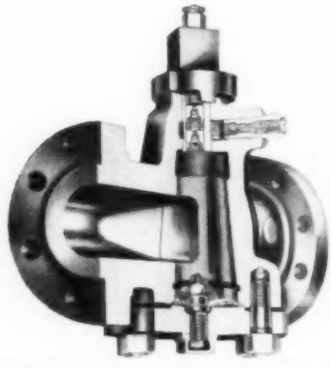


Screwed Gland Type Valve in 4" and smaller sizes for 200, 400 and 500-lb WOG. *Semi-Steel*

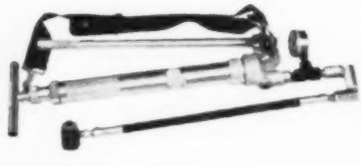


Bolted Gland Type Valve in 4" to 36" for 200 through 800-lb WOG Semi-Steel and ASA 150-lb and 300-lb Carbon Steel.

Hypreseal Valve—Bolted Bottom Cover Type. ½" to 30 by 34" for ASA 150-lb through 1500-lb Carbon Steel (with rectangular opening). API 2000-lb and 3000-lb WOG Alloy Steel Rectangular Opening. API 2000 and 3000-lb WOG Alloy Steel (with round opening).

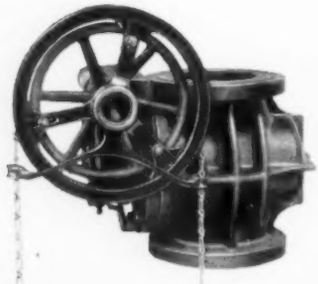


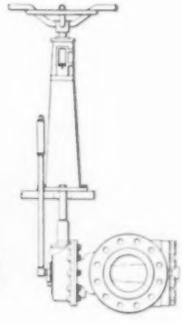
LUBRICANTS



PROPER VALVE LUBRICATION means longer valve life and better performance at lower cost. Rockwell is the world's oldest and most experienced manufacturer of lubricated plug valve lubricants. To assure perfect performance, a *complete line* of lubricants has been developed and field proved. For convenience, they are available in stick, tube and bulk forms. The Rockwell High Pressure Booster Type Hand Gun and Rockwell High Pressure Booster Type Bucket Gun make the lubrication of even a great number of valves a job that takes only minutes.

ACCESSORIES

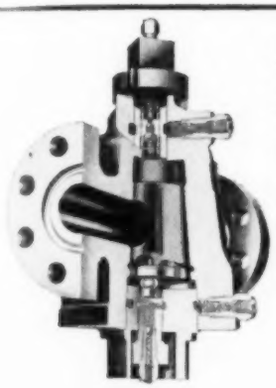




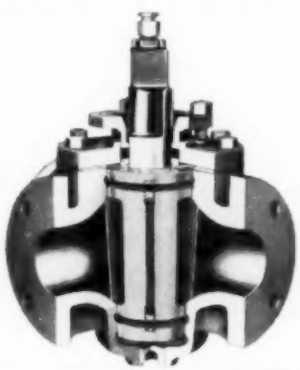
GREATER DESIGN AND INSTALLATION FREEDOM are the "extras" you get when you specify Rockwell-Nordstrom valves and accessories. No matter what your operating requirements or problems, you can select from a *complete* line of valve accessories that assure easier, safer, more efficient operation. While only a few of the valve accessories are shown above, you can learn about the complete selection by talking with your Rockwell-Nordstrom sales engineer or writing directly to: Rockwell Manufacturing Company, 400 N. Lexington Avenue, Pittsburgh 8, Pennsylvania.

LINE OF LUBRICATED PLUG VALVES,

ACCESSORIES



Hypreseal Valve—Screwed Bottom Cover Type. ½" to 8" for 7500-lb WOG Alloy Steel (rectangular opening). ASA 2500-lb Carbon Steel (rectangular opening). API 5000-lb and 10,000-lb WOG (rectangular opening) and API 5000-lb and 10,000-lb WOG (round opening).



Multiport Valve Type. Available in Gland type and Hypreseal type in WOG pressures to 400 lb and ASA pressures to 1500-lb. Sizes from ½" to 24".

ALL THESE ADVANTAGES

In *Every* Rockwell-Nordstrom Valve.

LEAKPROOF: Lubricant sealing is a *double* seal against leakage.

LONG-LIFE: Lubricant prevents metal-to-metal wearing friction.

LOW-COST: Lubrication is preventive maintenance.

DEPENDABLE: Hydraulic lubricant action jacks plug for instant operation.

QUARTER-TURN OPERATION: 90° turn for *full* positive shut-off.

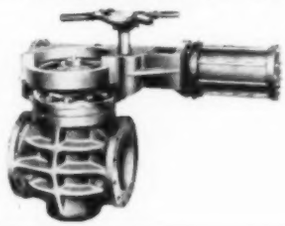
SMOOTH PASSAGE: Straight-through flow without crevices . . . minimum pressure drop.

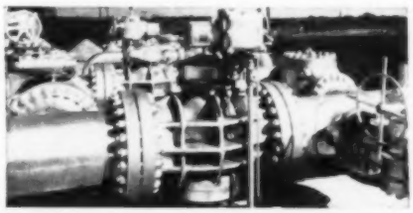
UNEXPOSED SEATS: Corrosion and erosion eliminated in vital seat areas.

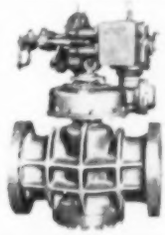
ADJUST, LUBRICATE UNDER PRESSURE: Never down time for routine servicing.

No other valve—at any price—can offer the performance and longer life at lower cost of Rockwell-Nordstrom valves.

POWER OPERATORS



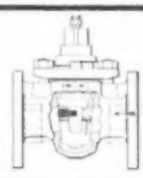




AUTOMATIC VALVE OPERATION is more dependable and economical when you specify Rockwell-Nordstrom valves. They are far superior to ordinary valves for power operation because *lubrication* reduces operating torque—smaller, less costly actuators can be used. And since there are no forced, wedged seats to be set, the actuator has only to move the lubricated plug through 90°.

Typical electric, pneumatic and cylinder operators shown above represent only three of the more than fourteen power operation arrangements available.

VALVES WITH SPECIAL FEATURES



NO MATTER WHAT YOUR NEEDS, there is a Rockwell-Nordstrom valve that will do the job better, longer and at lower cost. A few of the Rockwell-Nordstrom valves with special features are shown above.

Special metal valves are available in stainless-steel, bronze and other corrosion resisting alloys for even the toughest services. Valves with *hard faced plugs and bodies* combine the economy of semi-steel with hard facing for utmost corrosion and wear resistance. *Steam jacketed valves* for precise product temperature control. *By-pass relief valves* prevent pressure build-up that imposes dangerous stress on ordinary valves and fittings. *Gas safety control (Factory Mutual) valves* for positive control against explosion in multi-burner gas-fired furnaces, ovens and driers.

* * * *

Rockwell-Nordstrom valves and accessories are available at leading oil field and industrial distributors everywhere. For full information write: Rockwell Manufacturing Company, 400 N. Lexington Avenue, Pittsburgh 8, Pa. Canadian Valve Licensee: Peacock Brothers Limited.

ROCKWELL-Nordstrom **VALVES**

Lubricant Sealed For Positive Shut-off

For ACCURATE TANK GAUGING Get Wheaton *precision* in TANK GAUGES

Wheaton T-1600 Automatic Tank Gauge

This new Wheaton T-1600 Tank Gauge—developed and designed by Wheaton engineers—meets the most exacting requirements for *accuracy*. And it attains accurate gauging with a minimum of maintenance and wear.

The *large area* of the float assures the highest degree of sensitivity, and the use of 300 series stainless steel shafts and custom-fitted teflon bearings reduces friction to a minimum.

An exclusive "H" float affords easy fastening to guide wires without requiring special float guides or fasteners. The gauge can be read from the ground, obviating the need to climb the tank, and high visibility is assured by an easily-read, stainless steel tape, calibrated in feet, inches and eighths. The unit is powered by a specially engineered stainless steel neg'ator spring motor.

For maximum accuracy in tank gauging, install Wheaton T-1600 Gauges. They can be used on all types of tanks, including underground, and for all low-pressure storage.

Send for catalog No. 66, which illustrates and describes the complete line of Wheaton Tank Fittings.

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Manufacturers of Loading Arm Assemblies, Swing Joints, Loading Valves, Tank Fittings and Truck Tank Equipment

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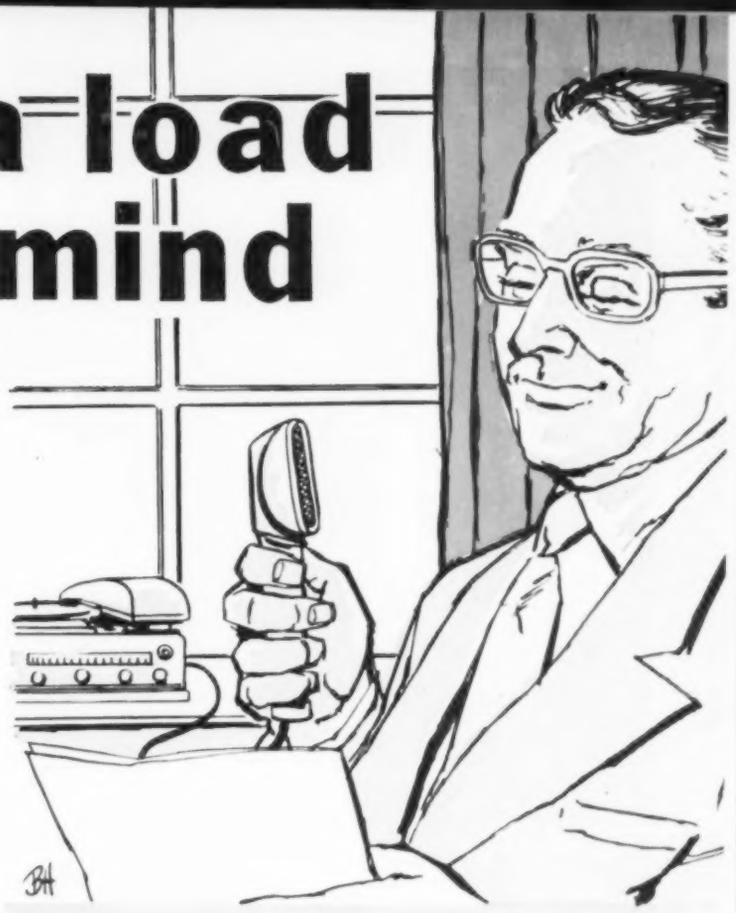
Tank Fittings by Wheaton

the best by every standard

You lift a load off your mind

WHEN YOU SAY

GASO



You're *sure*, when you specify GASO, of pumps that do what they're supposed to do — dependably, economically and for periods that extend far, far beyond accepted replacement intervals. You *know*, when you standardize on GASO Pumps, that you are following the lead of many of the world's best known, best managed pipe line operators. There's safety and assurance in such a choice. We're as close to you as our nearest distributor.

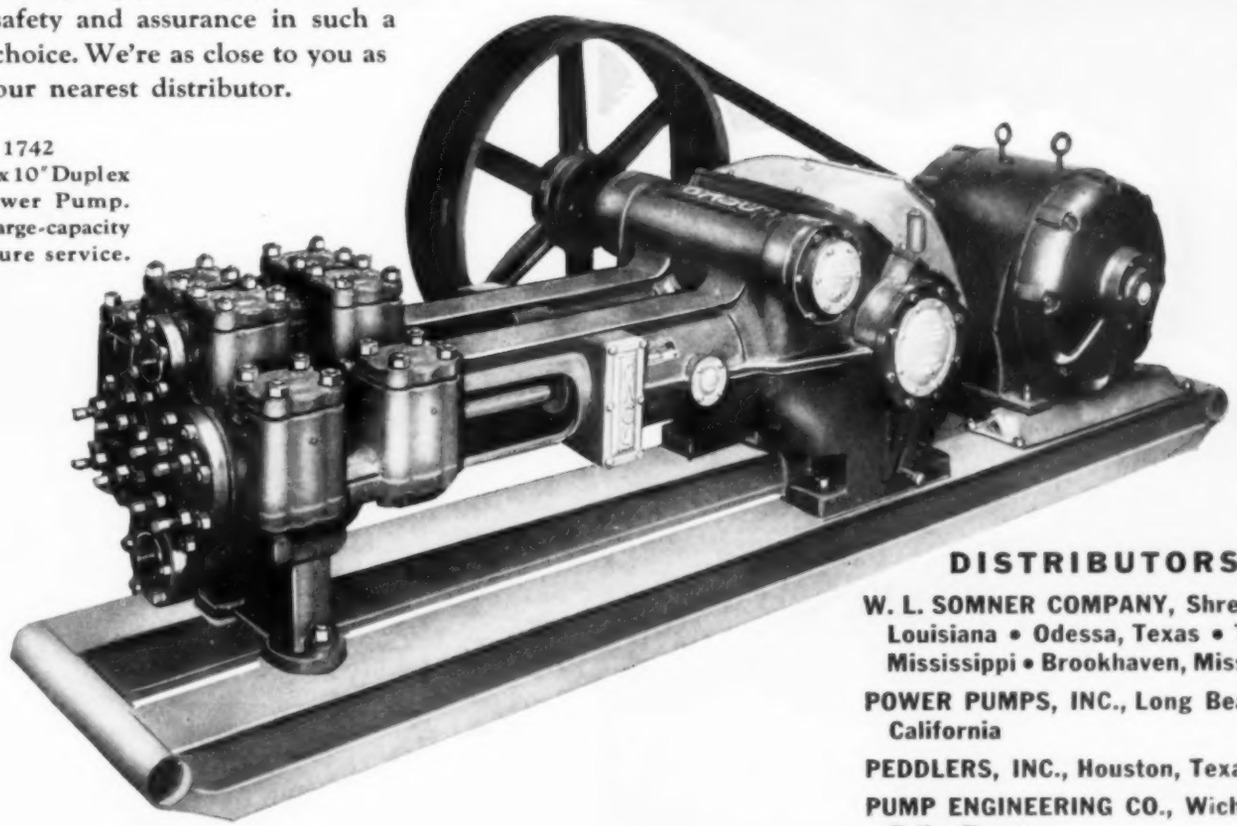


Fig. 1742
2½" to 5½" x 10" Duplex Piston Power Pump. Ideal for large-capacity high-pressure service.

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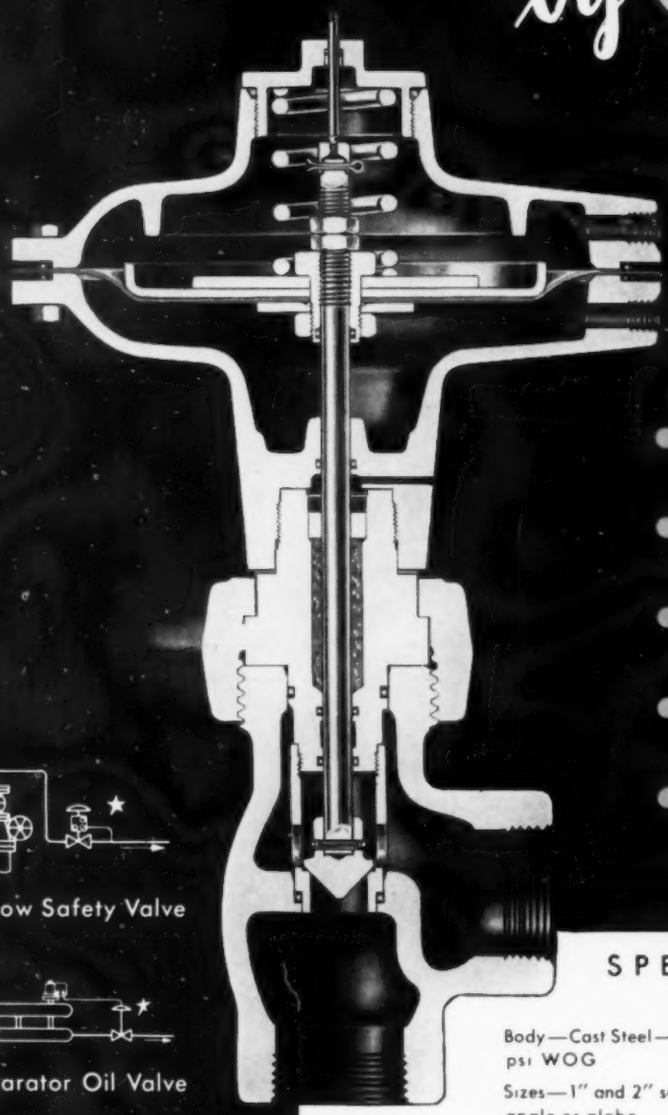
A New FIELD VALVE by FISHER®

Series 125P

HIGH PRESSURE DIAPHRAGM CONTROL VALVE



- RUGGED CAST STEEL BODY GOOD FOR 2000 psi PRESSURE
- ONE INNER VALVE FITS ALL ORIFICES
- TOPWORKS INTERCHANGEABLE ON ALL BODIES
- DIAPHRAGM CASINGS SUITABLE FOR 50 psi OPERATING PRESSURE
- TOPWORK ACTION REVERSIBLE WITH NO ADDITIONAL PARTS

WRITE FOR BULLETIN O-125P

Hi-Low Safety Valve

Separator Oil Valve

Time Cycle Intermitter

SPECIFICATIONS

Body—Cast Steel—2000 psi WOG

Sizes—1" and 2" screwed angle or globe

Orifice Size—1" Body—¼", ⅜", ½", ¾" 2" Body—¼", ⅜", ½", ¾", 1"

Valve Cage—440 hardened St. Steel. (Tungsten carbide insert also available.)

Inner Valve—440 hardened St Steel (Tungsten carbide tip also available.)

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MARSHALLTOWN, IOWA · WOODSTOCK, ONTARIO

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. . . . with Pulse Beat telemetering!

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PRESSURE • TEMPERATURE • FLOWS

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As part of a supervisory control system . . .

- **it is inherently suitable for integration into data reduction and tone transmission systems.**
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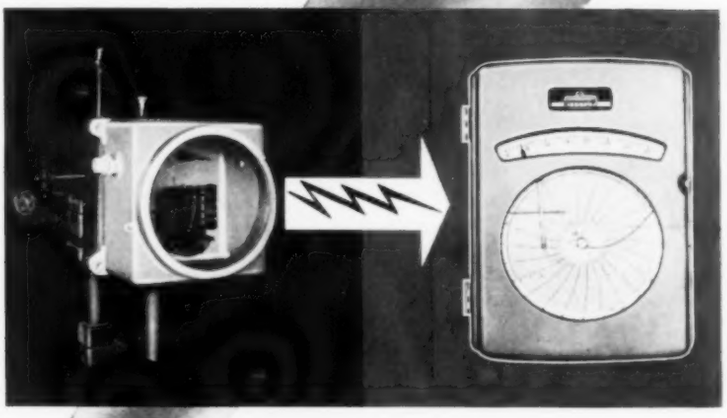
Act today! Request Bulletin 230-H4A for complete data. Let Builders application engineers help with your metering-control problems.

Write **Builders-Providence, Inc., (an associate of Proportioneers, Inc.) 545 Harris Avenue, Providence 1, Rhode Island.**



CHRONOFLO TELEMETER FEATURES . . .

- Sensing and receiving reactions depend upon the *positively* controlled duration of regular electric circuit closures and *nothing* more.
- This pure, *positive-action* positioning system *does not* have to *translate* units of electric measurement into terms of function measured.
- Accuracy *not* affected by normal variations in ambient temperatures, static pressures, line voltages, resistance, or inductance.
- Adjustment *not* upset by power failure Chronoflo resumes accurate measurement on restoration of power.
- Chronoflo Receiver *not* inferentially positioned except with respect to time duration of Transmitter signal.

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How do you lay a pipeline? You dig the dirt. You blast the rock. You fight the water. And you try to stay on schedule.

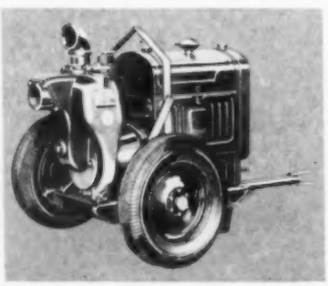
When it rains hard . . . or you hit a bog, that water can lick you. So you depend on Gorman-Rupp Pumps.

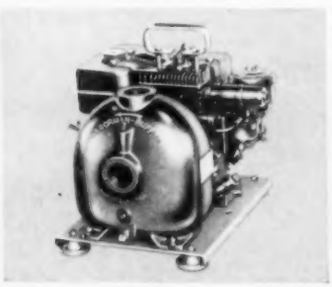
Laying pipelines, the pumping jobs come up in a hurry, require fast pumping. You dare not fail—so you call on Gorman-Rupp Pumps. They keep the job moving . . . whether for highways, dams, bridges, buildings . . . or for pipelines.

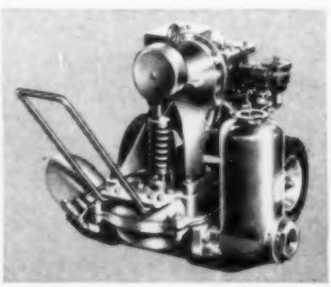
Pipeliners *know* Gorman-Rupp Pumps are "unsurpassed for pumping fast." You are near a Gorman-Rupp Distributor. In emergencies, telephone.

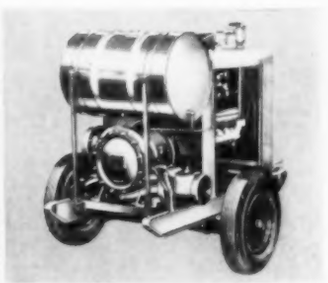
THE GORMAN-RUPP COMPANY

305 Bowman Street • Mansfield, Ohio

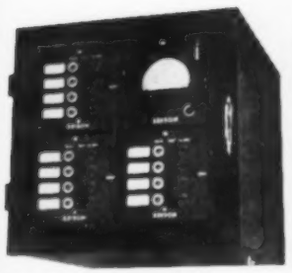

Contractors' Pumps — 3" to 10"


"80" Series Lightweights — 1½" to 3"


Diaphragm Pumps — 3" and 4"


Jetting Pumps

EDISON'S OMNIGUARD continuous temperature monitoring offers absolute dependability



Can be supplied for any type of annunciator or telemetry system

Edison has the answer to prohibitive pumping station and plant shutdown due to motor, generator or pump bearing failure. It's Edison's Omniguard, devised to detect and warn of excessive temperatures well in advance of danger points **with absolute dependability.** The use of Omniguard means the saving of thousands of dollars in downtime and maintenance man hours.

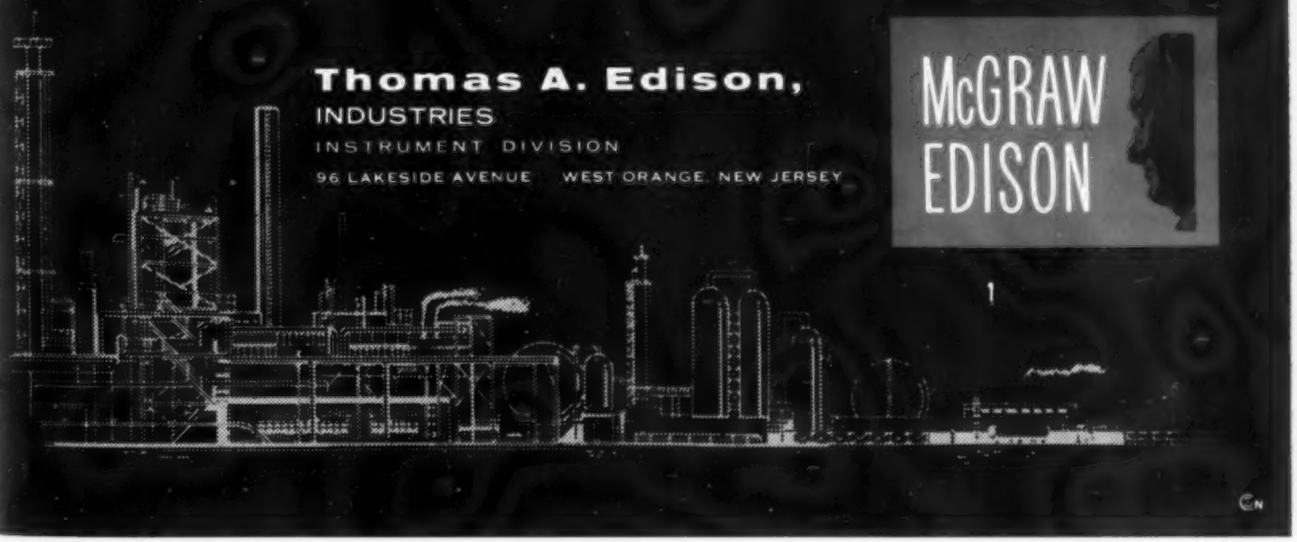
Here's how Omniguard works: easy-to-install resistance temperature detectors are inserted into the equipment to be monitored and are wired directly into the central control unit as one leg of a simple Wheatstone bridge circuit. No electronic circuits, moving parts, adjustments, or maintenance is involved in this fail safe instrument. As soon as a temperature rise occurs the mechanism is automatically shut off and an annunciator of any type (proximate or remote including telemetry) signals the warning.

Omniguard can monitor from four to four hundred points with the simple addition of building block units; each point is independently circuited so that Omniguard continues to monitor if other points are shut down. Critical temperatures exist everywhere in the petroleum industry — from remotely unattended pipeline stations to catalytic "crackers," where processes are in motion, or where machinery is in operation. Learn how Omniguard can save you money initially — costs less than any other system available — and thereafter — eliminates downtime, maintenance and manual inspection of equipment.

Write and tell us about your particular temperature monitoring problem.

SPECIFICATIONS:

Voltage:	115 volts, 60 cycles
Power drain:	25 VA maximum
Voltage error:	±2°F. maximum from 100 to 130 volts
External alarm:	1 per monitor. Contact rating 150 watts or 3 amp. non-inductive load



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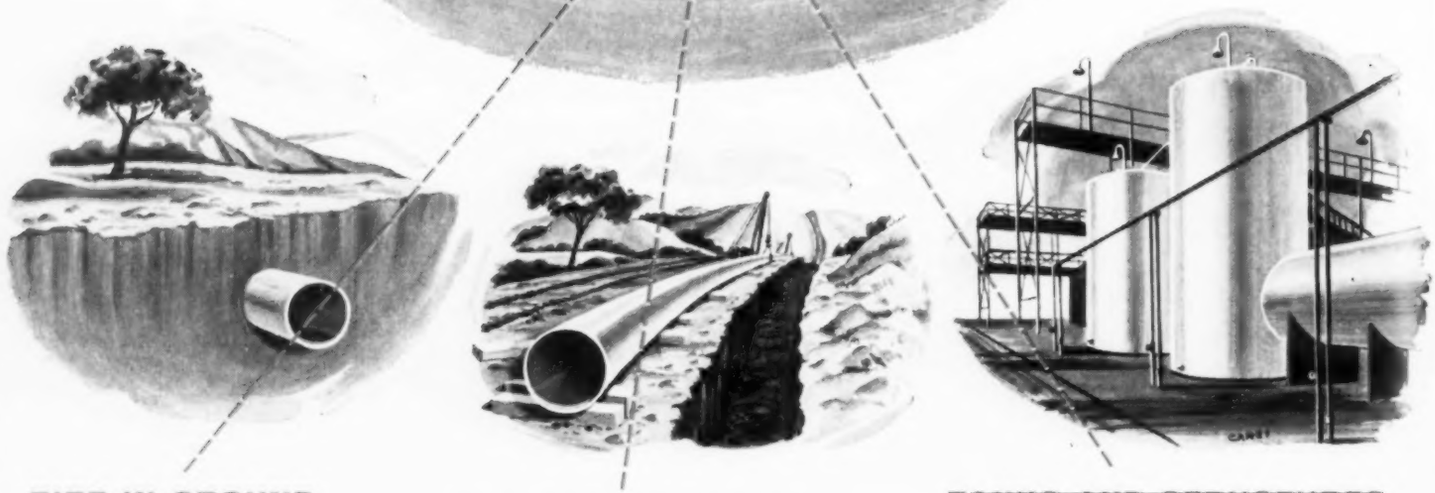

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In every phase of the oil and gas industry, Copon Coatings are doing a job reducing corrosion losses. But in many instances, they are accomplishing even more.

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Copon Coatings, and systems for coating underground pipe lines in place or individual joints for new construction, have been developed in close cooperation with leading corrosion engineers. A complete technical service is available. Write today for help with your specific problem.

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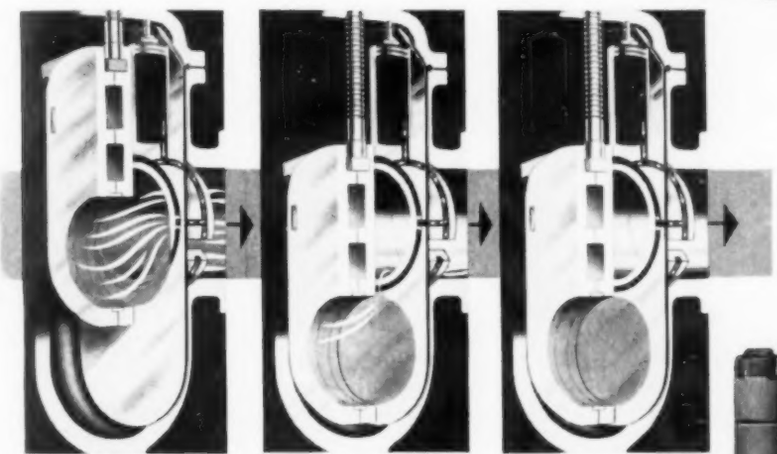
For pipeliners who hate leaks!

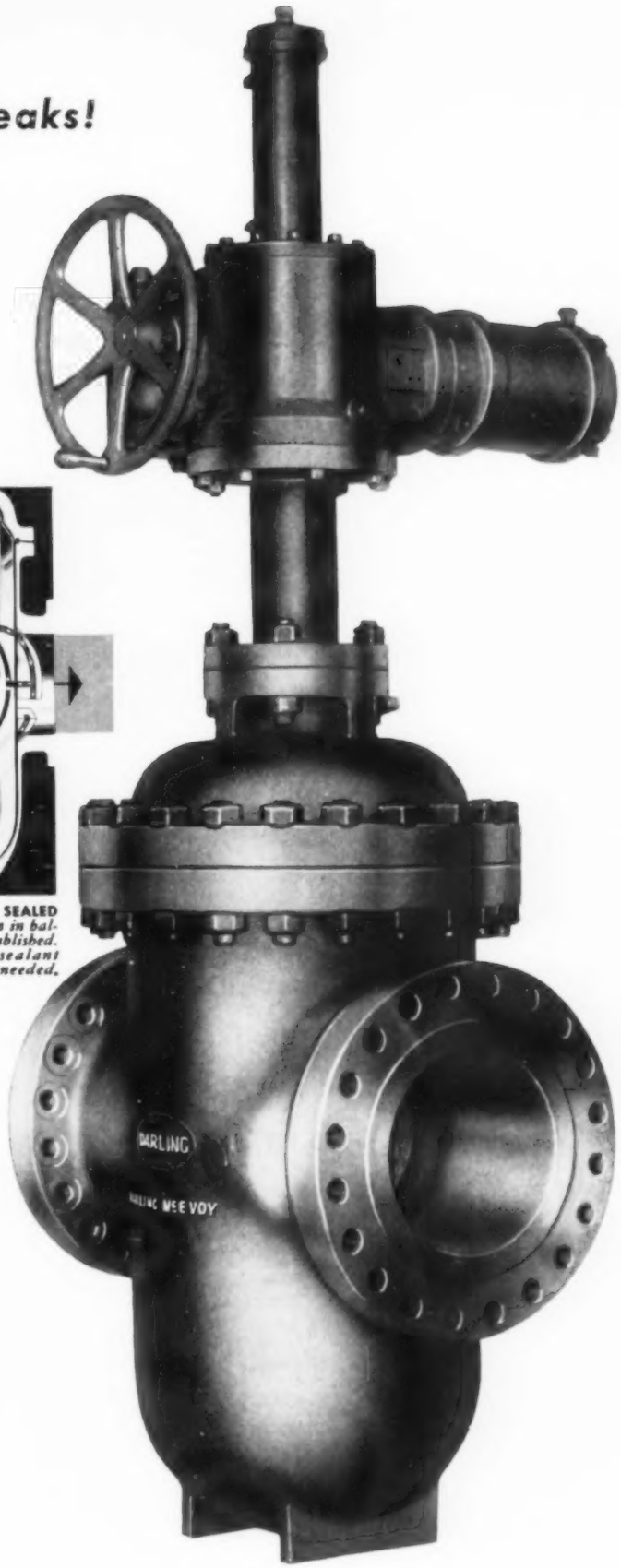
DARLING-McEVOY SELF-SEALING CONDUIT VALVES



APPROACHING CLOSURE *... No loss of sealant as sealing groove in seat is disconnected from reservoir until gate is fully closed.*

CLOSED *... Jumper in gate now permits differential pressure to feed sealant into seat groove to check any remaining flow.*

AUTOMATICALLY SEALED *... Pressures again in balance. Tightness established. No additional sealant used until again needed.*



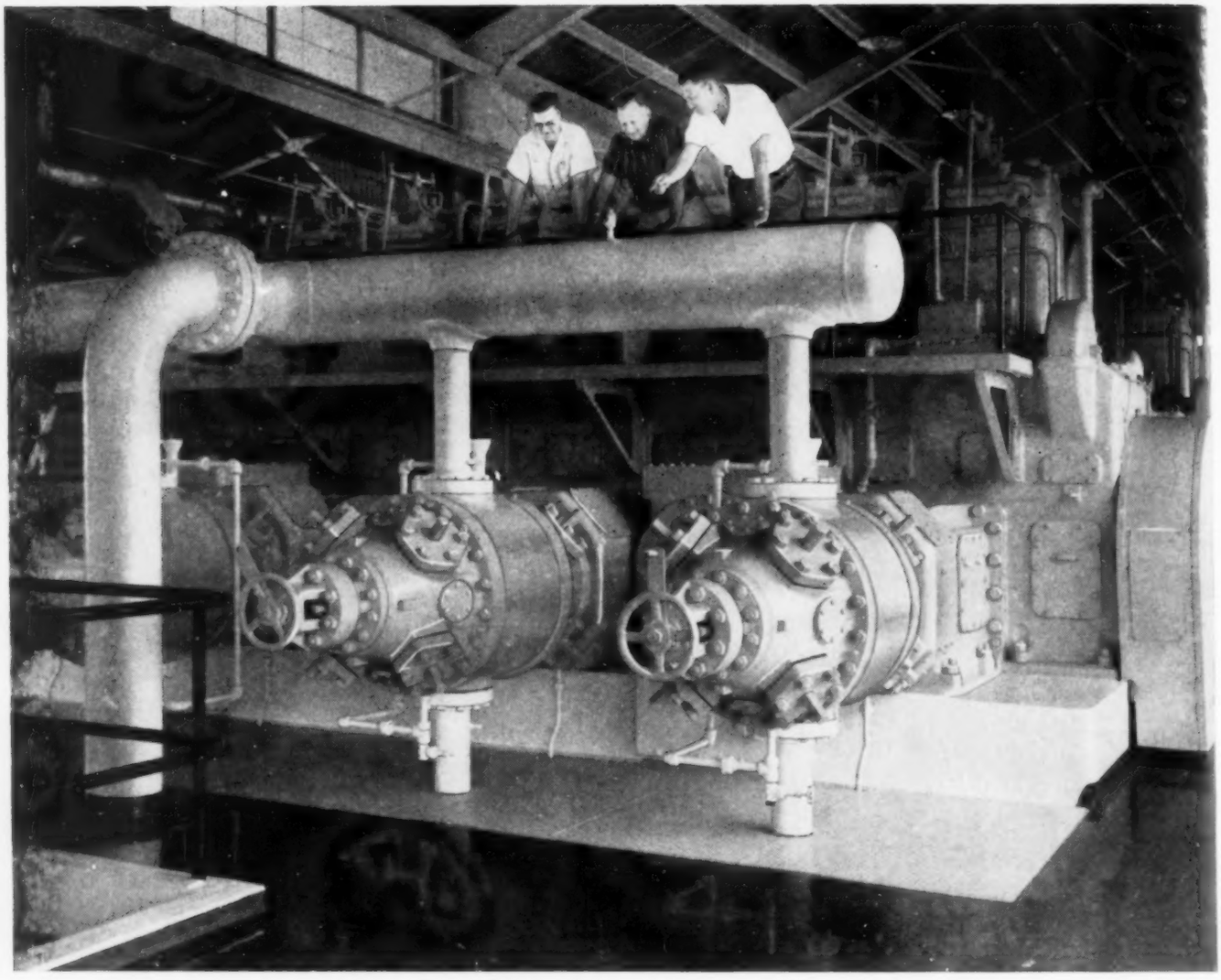
THE DIAGRAMS above show how these unique conduit gate valves seal themselves *automatically* . . . by means of a long lasting reservoir-held sealing compound . . . for leak-proof, pressure-tight closure every time! This feature, with flow in either direction, self-aligning non-wedging gates, and fully protected non-distorting seats, means exceptional performance, utility and service life. For additional information on these fully field-proved Darling-McEvoy valves, ask for Bulletin 5402.

DARLING VALVES

DARLING VALVE & MANUFACTURING CO.

Williamsport 27

Manufactured in Canada by Sandilands Valve Manufacturing Company, Ltd., Galt 19, Ontario



Richard N. Rogers, Results Engineer (left), W. C. Drienhofer, Station Superintendent, and R. A. Cuyler, Jr., Gulf Sales Engineer, inspect one of the 31 units lubricated by Gulf Security since 1944.

At Tennessee Gas Transmission Company's Middleton Station . . .

Not a ring change in 26,800 hours with

GULF SECURITY OIL

31 gas engine compressor units have been running smoothly at the Middleton Station with Gulf Security Oil since 1944. The records show 26,800 hours operation without a single ring change. And after 85,000 hours, Security in the crankcase was still in excellent condition.

Here for 13 years Gulf Security has lived up to its name—security against operating troubles and high maintenance costs. Gas engine compressor units lubricated with Gulf Security are consistently free of heavy port and ring belt deposits. Wear is negligible —in fact, ring and liner life in both power and compressor cylinders is well above average. Bearings last longer, too.

When you use a Gulf product you get an extra dividend—the free services of an experienced Gulf engineer. He's always "on call" to assist you with any problem involving lubricants, fuels, or any other petroleum product. Write, wire or phone your nearest Gulf office.

GULF®

GULF OIL CORPORATION

1822 Gulf Building
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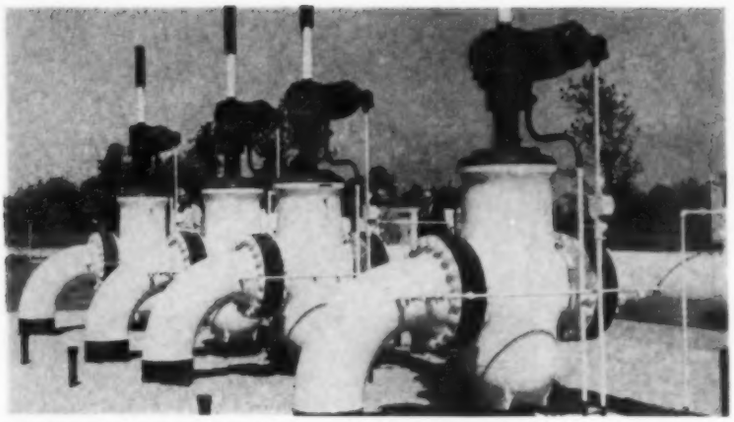
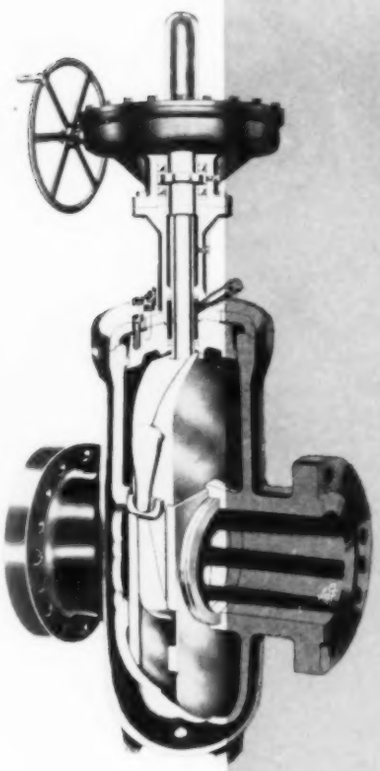


W-K-M *Valves on gas line manifold.*

W-K-M THROUGH CONDUIT VALVES MEAN PIPELINE OPERATING ECONOMY



5705

The through-conduit of W-K-M Valves means "expressway" flow on the pipeline. There's no turbulence—no more pressure loss through a full-opening W-K-M Valve than through the same length, same size pipe—no additional power required to move gas or liquid through the line—that's economy!

W-K-M Valves have the right variable ratio of port opening to gate travel to close smoothly and rapidly without setting up dangerous line surges. Scrapers pass through the valve as easily as they go down the line—there's no danger of sticking a "pig" in a W-K-M Valve.

Here's more economy with W-K-M Valves—seats are protected against damage in either open or closed position; Leverlock* assures free movement of gate against any pressure; and repairs can be made without removing the valve from the line, and in many instances while valve is under pressure.

Specify W-K-M Through-Conduit Gate Valves for years of service with minimum maintenance.

W-K-M ASA Through-Conduit Gate Valves are available in sizes 2" through 30"—ASA 300 lbs. to ASA 900 lbs. Valves up to 12" available through supply stores.

*Trademark of W K M a Division of OCF Industries, Inc.

W-K-M
DIVISION OF OCF INDUSTRIES INCORPORATED

PLANT: MISSOURI CITY, TEXAS
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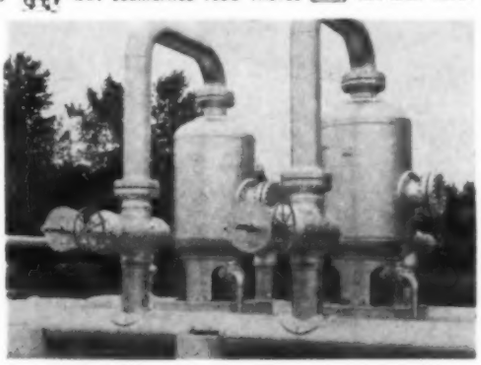
MANUFACTURERS OF W K M GATE VALVES OCF LUBRICATED PLUG VALVES KEY-KAST ALLOY STEEL PIPING FITTINGS KEY RETURN BENDS AND FITTINGS



W-K-M *Valves on inlet scrubbers on main line compressor station.*

For complete information, write Dept. J-10 for new W-K-M ASA Through-Conduit Gate Valve Catalog 300.

FEEDING THE BIG TRANSMISSION LINES . . .
4" and 6" ELECTRIC WELD LINE PIPE* from Acme-Newport

The first movement of oil and gas is through countless gathering lines, the pipe in which this mill specializes. Acme-Newport pipe is uniform in wall thickness and roundness, lines up properly, bends and welds with ease, is economical to install.

Its high quality stems from Acme-Newport's 72 years' experience as basic steel producers, their modern facilities and exacting control of every operation from electric furnace to hydrostatic testing. Buy this tough, long-lasting, standard or thin wall pipe that surpasses every API and ASTM specification and renders uninterrupted service under high pressure.

*SIZES AND WEIGHTS AVAILABLE

O.D.	Wall	Wt. Per Ft
4½	.125"	5.84
	.142"	6.61
	.156"	7.25
	.188"	8.64
	.219"	10.03
	.237"	10.79
6⅝	.134"	9.29
	.156"	10.78
	.188"	12.89
	.219"	14.97
	.250"	17.02
	.280"	18.97

ECONOMICAL WATERAIL-TRUCK DELIVERY

Acme-Newport Steel COMPANY
NEWPORT, KENTUCKY
A SUBSIDIARY OF ACME STEEL COMPANY

STAYNEW® FILTERS

Dollinger makes ALL TYPES of filters as shown on this page, plus special filters for unusual filtration problems. New users of one specific type of Staynew filters often find a second Dollinger filter performs a great, added service in other processes or operations. Perhaps we can serve major or other filtration needs of your plant.

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Model HE (Sump)
Liquid Filter
Bulletin 330

Model ELS (Pressure)
Liquid Filter
Bulletin 300

PIPE LINE FILTERS

Model CPH
Pipe Line Filter
Bulletin 200

Model CVH (Vacuum)
Pipe Line Filter
Bulletin 200

Model AAPHS
(Absorption)
Pipe Line Filter
Bulletin 200

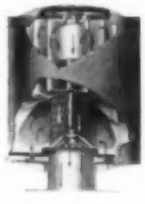
Model HPH and AHPH
(High Pressure)
Pipe Line Filter
Bulletin 200

all types of FILTERS for every INDUSTRIAL NEED

AIR INTAKE FILTERS

Model IDR
(Ground Level)
Air Intake Filter
Bulletin 100

Model DS (Silencer)
Air Intake Filter
Bulletin 100



Model D (Outdoor)
Air Intake Filter
Bulletin 100

Model C (Indoor)
Air Intake Filter
Bulletin 100

VENTILATION FILTERS

Electro-Staynew Mist Collector
Bulletin 420

Electro-Staynew Precipitator
Bulletin 400

Automatic Ventilation Filter
Bulletin 500

Dry and Viscous Panel Ventilation Filters
Bulletins 600 and 700

REG. PROTECTOMOTOR U.S. PAT. OFF.

Write, using Bulletin Numbers, for complete information on any of the Staynew filters illustrated. Consult Dollinger engineers on any special filtration problems—no obligation. Dept. 95 Centre Park, Rochester, New York.

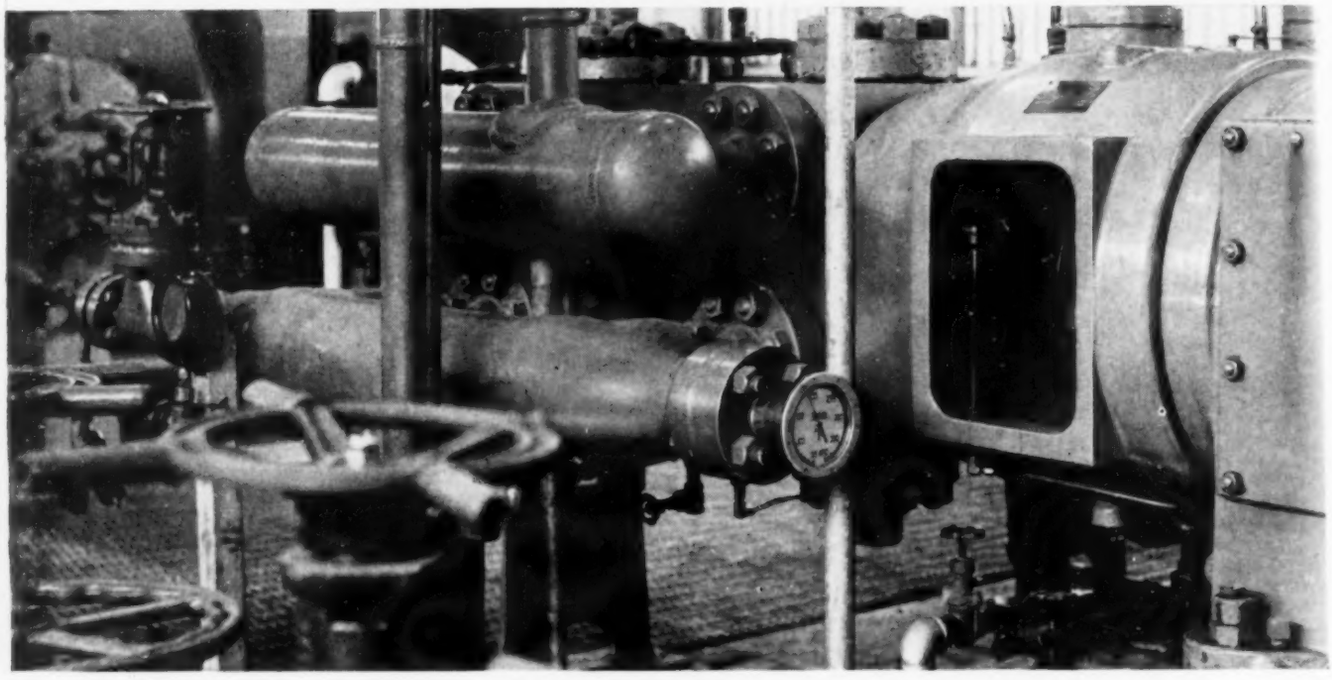
STAYNEW **DOLLINGER**

FILTERS

LIQUID FILTERS • PIPE LINE FILTERS • INTAKE FILTERS • HYDRAULIC FILTERS • ELECTROSTATIC FILTERS • MIST COLLECTORS • DRY PANEL FILTERS • SPECIAL DESIGN FILTERS • VISCOUS PANEL FILTERS • LOW PRESSURE FILTERS HIGH PRESSURE FILTERS • AUTOMATIC VENTILATION FILTERS • NATURAL GAS FILTERS • SILENCER FILTERS

For more data on advertised products, use Readers' Service Cards, last page.

VIBRATION



Vibration of refinery compressor proves unshakable accuracy of RMC thermometer

The RMC Thermometer shown in the photograph is constantly subjected to extreme vibration from the two-stage Synthesis Gas Compressor on which it is installed. This powerful equipment is used to compress a mixture of H_2 and N_2 from 400 to 3500 pounds – at the Philadelphia Synthetic Ammonia Plant of The Atlantic Refining Company.

This particular job required a special thermometer that could withstand the constant and terrific vibration, and at the same time provide and maintain precise, accurate readings. Rochester Manufacturing Company promptly came up with the answer – a silicone-dampened, bimetallic, angle-form RMC thermometer. And this is but one example of how RMC engineering skill provides instruments that meet the most demanding and exacting requirements.

Look to RMC for Full-Line Instrumentation

DIAL THERMOMETERS

Illustrated here is a 6" dial thermometer with hermetically sealed dial chamber, external recalibration—built for heavy duty service. What are your thermometer requirements?

PRESSURE SWITCHES

This RMC Pressure Switch will stand heavy pulsating pressures, has close on-off differentials, maintains consistent cut-in, cut-out settings. What are your pressure switch problems?

TELL US YOUR REQUIREMENTS FOR DIRECT MOUNTING AND REMOTE INDICATING INSTRUMENTS, AND LET RMC ENGINEERING SKILL PROVIDE THE ANSWERS!

REPRESENTATIVES IN ALL PRINCIPAL CITIES

RMC

"You Can Rely On Rochester"

LIQUID LEVEL, TEMPERATURE and PRESSURE INSTRUMENTS

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ROCHESTER MANUFACTURING CO., INC.
207 ROCKWOOD STREET • ROCHESTER 10, N.Y.

PIPE LINE PANORAMA

Put "Color" in Your Surveys . . . Look for increasing use of aerial color photography in making rapid, high quality surveys of pipe line rights-of-way. Reasons:

- Color film reveals minute changes in formations and soil which might never be detected by ground crews.
- Slightly higher cost is more than offset by savings of time-consuming ground party work.
- Black and white prints, used for surveys and mosaic work, can be made from color transparencies with little trouble.

A check of aerial survey companies reveals increasing use and interest in color photography for pipe line work.

Year-Round Pipe Line Construction? . . . Canadian contractors expect pipe line construction to become almost a 365-day operation. During winter of '56, work on stringing, right-of-way and we'ding was hardly interrupted. Last major project of '57, northern Ontario section of Trans-Canada gas line, is expected to extend past Christmas.

Reasons: Semi-automatic yard double jointing gave winter welding operations a big boost—new improved coatings and tapes are expected to simplify pipe protection problems during winter work. Also, frozen right-of-way work expedites travel over muskeg roads.

Reduce Those Hurricane Damage Costs . . . After intensive studies, oceanographers have developed pipe line design recommendations believed to be the answer to hurricane problems in Gulf offshore operations (See Page 37). Three of the findings include:

1. If pipe is filled with water during laying it will be more dense than sediments, thus decreasing chances of wave and current damage.
2. If pipe is buried at least six feet there will be very little agitation, line will remain stable even during major hurricanes. Also, when buried at this depth, pipe will remain relatively free from agitation created by "mud holes" (regions where ordinary waves keep bottom sediments fluid at all times).
3. Studies at Grand Chenier, La., indicate pipe should be buried at least 10 feet below bottom sediment in shallow water near beaches to prevent scouring.

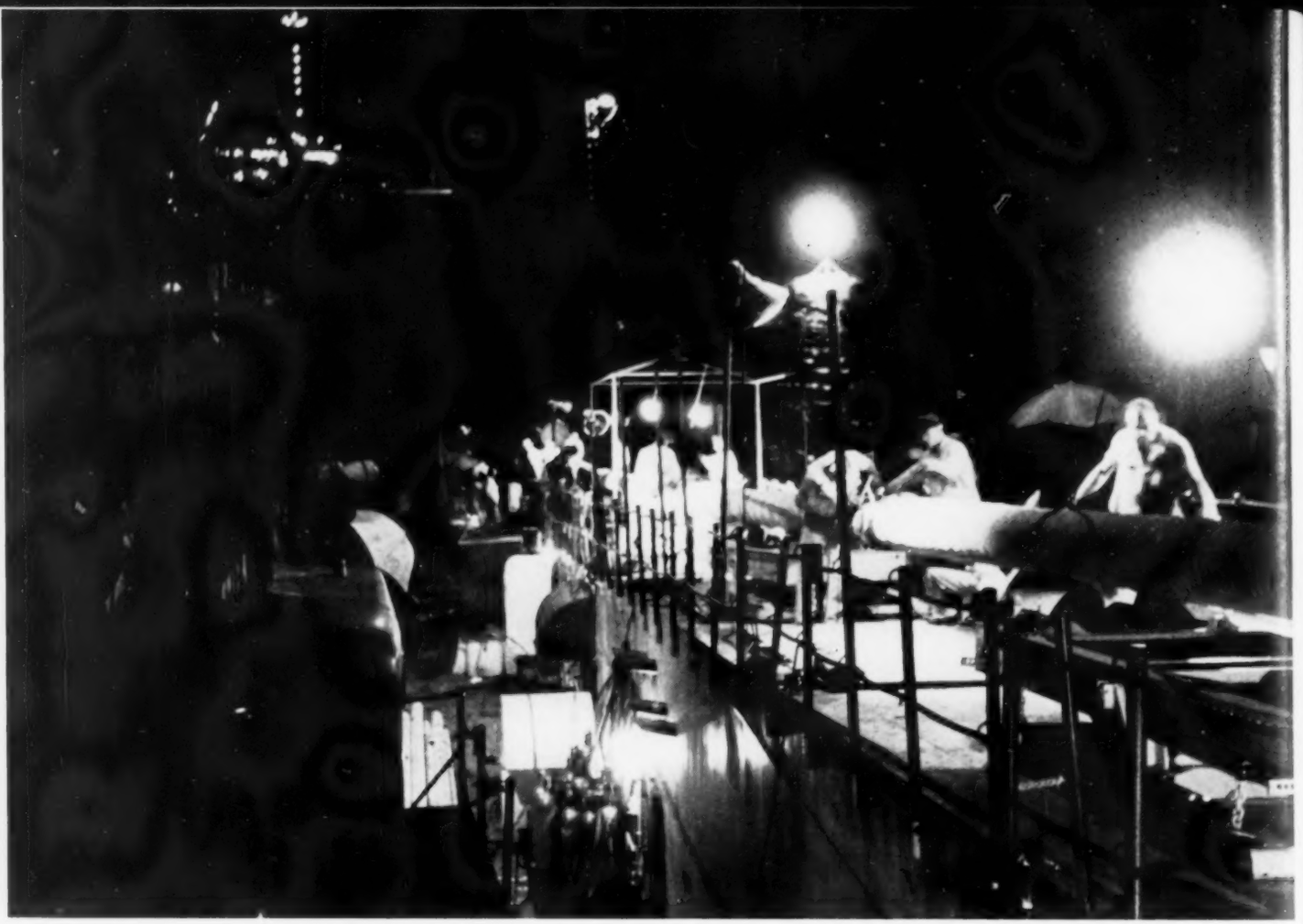
Higher Costs—Lower Earnings . . . For first time since World War II, gas pipe line earnings have indicated downward trend. In June, 37 major pipe lines under F.P.C. regulation reported an average 4.8 percent drop in net income, compared with same month in '56. Earnings for fiscal year ending in June dropped 1.9 percent, from $236.4 million in '56 to $231.9 million.

Although operating revenues are up over '56 ($2.2 billion vs. $2 billion), gas cost is up 16.7 percent, transmission costs are up 12.8 percent.

Because of these red ink factors, look for gas industry leaders to request 7 percent return rate with valid arguments supporting contention that customary 6 percent return just isn't enough.

Sky's the Limit for Gas Pipe Line Growth . . . Latest American Gas Association survey predicts gas transmission companies will set new expansion records in next four years ('57-'60). Will spend $3.9 billion for transmission facilities alone. Following are some of the items the billions will buy:

- 10 million tons of steel, with peak requirement of 2.7 million tons being reached in '57. More than half of four-year total (5.7 million tons) will be 16" and larger pipe used primarily by transmission companies. Other needs will include 2.3 million tons of 6⅝"-16" pipe, and 2 million tons of less than 6⅝".



Night pipelaying offshore. Work continues around the clock by using two 12-hour work shifts. Here the night crew makes good progress as five to six joints per hour are completed. Cooler temperatures and smoother sea conditions often favored night work.

Offshore Developments

New Barge Pushes Pipe Laying Seaward

Inclined 260-foot centerline work ramp puts pipe in the water with smooth overbend. Air-conditioned living quarters facilitate around-the-clock work up to 50 miles out in the Gulf.

By Melvin A. Judah, Editor

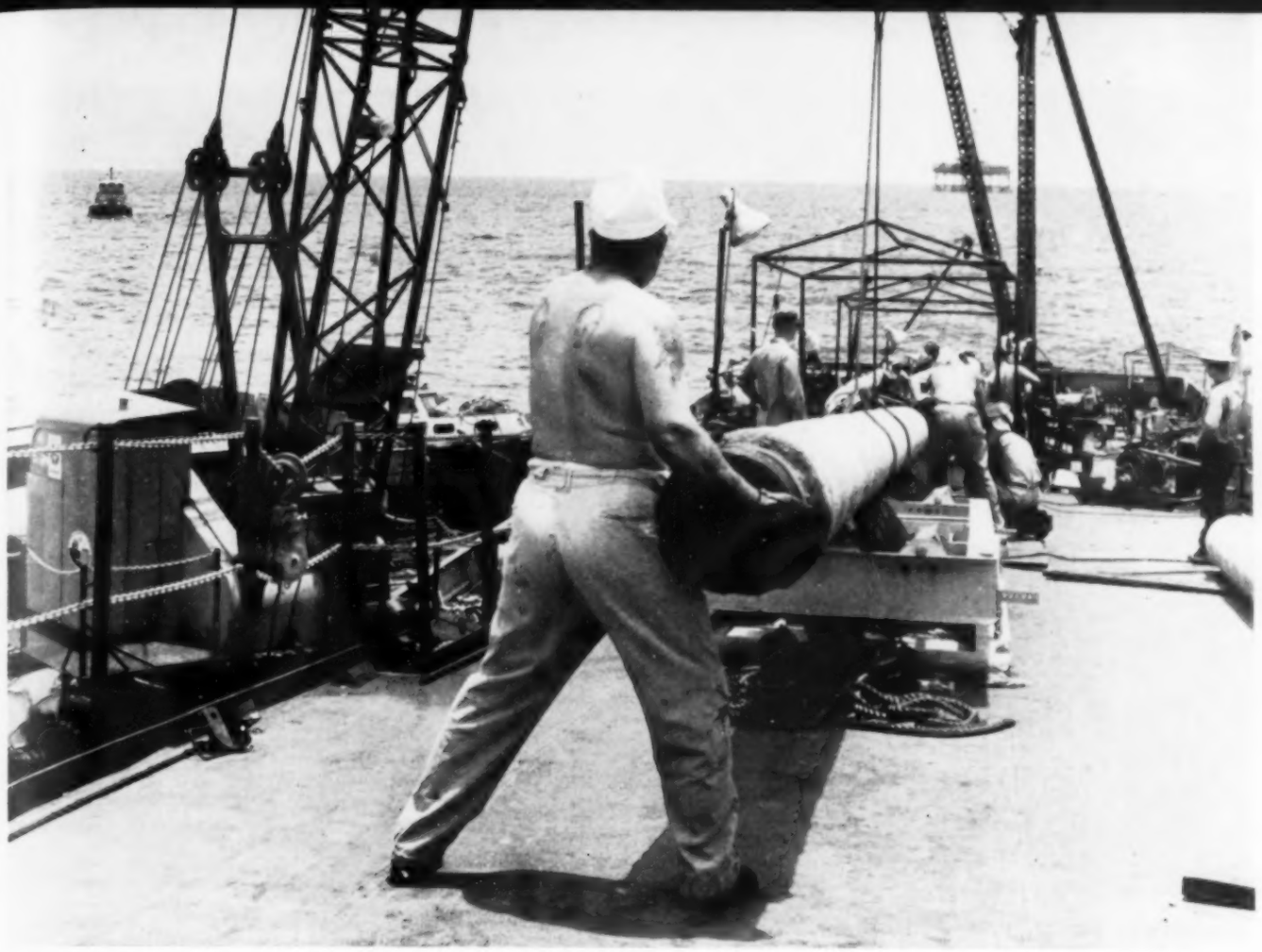
IN SPITE of two hurricanes and a tropical storm, submarine pipe line construction in the Gulf has seen a peak of activity this past summer. In a record year of offshore work, four lines are being completed to bring oil and gas from offshore producing areas. One of the latest additions to the specialized pipe laying "fleet" is Marine Gathering Company's barge *Magic*. Name of the barge may be somewhat misleading; laying pipe lines in Gulf waters 100 feet deep takes a lot more hard work and ingenuity to get the job done than it does magic.

First job for the big barge was the laying of a 25-mile system of 6, 8, and 12-inch lines for Continental Oil Company, operator for the CATC group. The longest line, a 22-mile, 12-inch trunk will bring oil and gas ashore in two-phase flow from gathering facilities on platform 47A to a terminal near Grand Isle, La. Design capacity of the main trunk is approximately 31,000 barrels of liquids and 46,000 Mcf of gas daily.

Gas and oil will be separated and measured at the onshore terminal where gas will be delivered to a gas transmission line and crude to pipe line or to a barge terminal. The Grand Isle terminal is being built by Ward Construction Company.

First Gulf Pipe Line Operator Becomes Contractor. Marine Gathering Company has had seven years of pipe line experience in the Gulf. Its first line was nine miles of 8-inch to a Rollover field platform of the Pure Oil Company off Vermilion Parish, Louisiana, in 1950. A second main line, 9½-miles of 10-inch was laid to a Phillips Petroleum Company-Kerr McGee platform in the same field in 1953.

The *Magic* represents an investment of nearly $¾ million in a sea



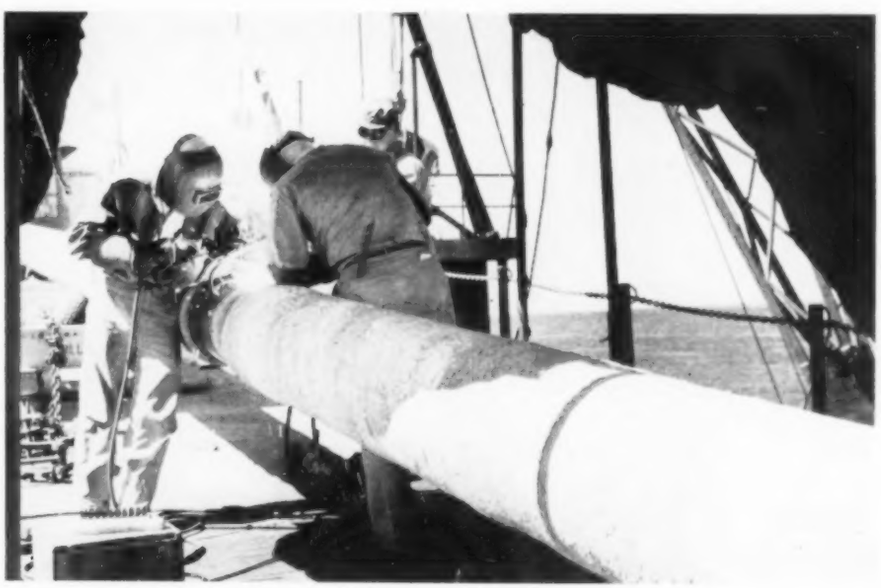
At the head of the 260 foot inclined ramp a 40-foot joint of 12-inch pipe is lined up and stringer bead is run at first station.

Extra joints of pipe brought aboard from the supply barge lay alongside the first station. Cranes permit work from either side.

going pipe line spread. Built to American Bureau of Shipping and Coast Guard specifications for seaworthiness and safety, it has a 260-foot inclined welding and launching ramp. Its 50 foot beam and 13½-foot hull depth provide required stability for work even in moderate squalls.

A ballasting system within the hull permits a minimum draft of 4-feet when working in shallow inshore waters and up to 8-feet for positive control in greater depths farther at sea. Watertight compartmentation is achieved with longitudinal and transverse bulkheads within the hull. Submerged exterior surfaces of the hull are protected with sacrificial anodes.

Inclined Centerline Ramp Launches Pipe. Mechanical equipment and layout of the *Magic* was designed to permit laying 2000 feet of 16 inch pipe a day or 5000 feet of smaller pipe. At the high part of the ramp forward, 40-foot joints are set on the workway, lined up, and welds are completed at two stations. All welds are being X-rayed before the joint is protected with a field joint form and coal tar enamel. Concrete weight coating is then applied to the joint in a sheet metal form at a station near the stern well deck section.



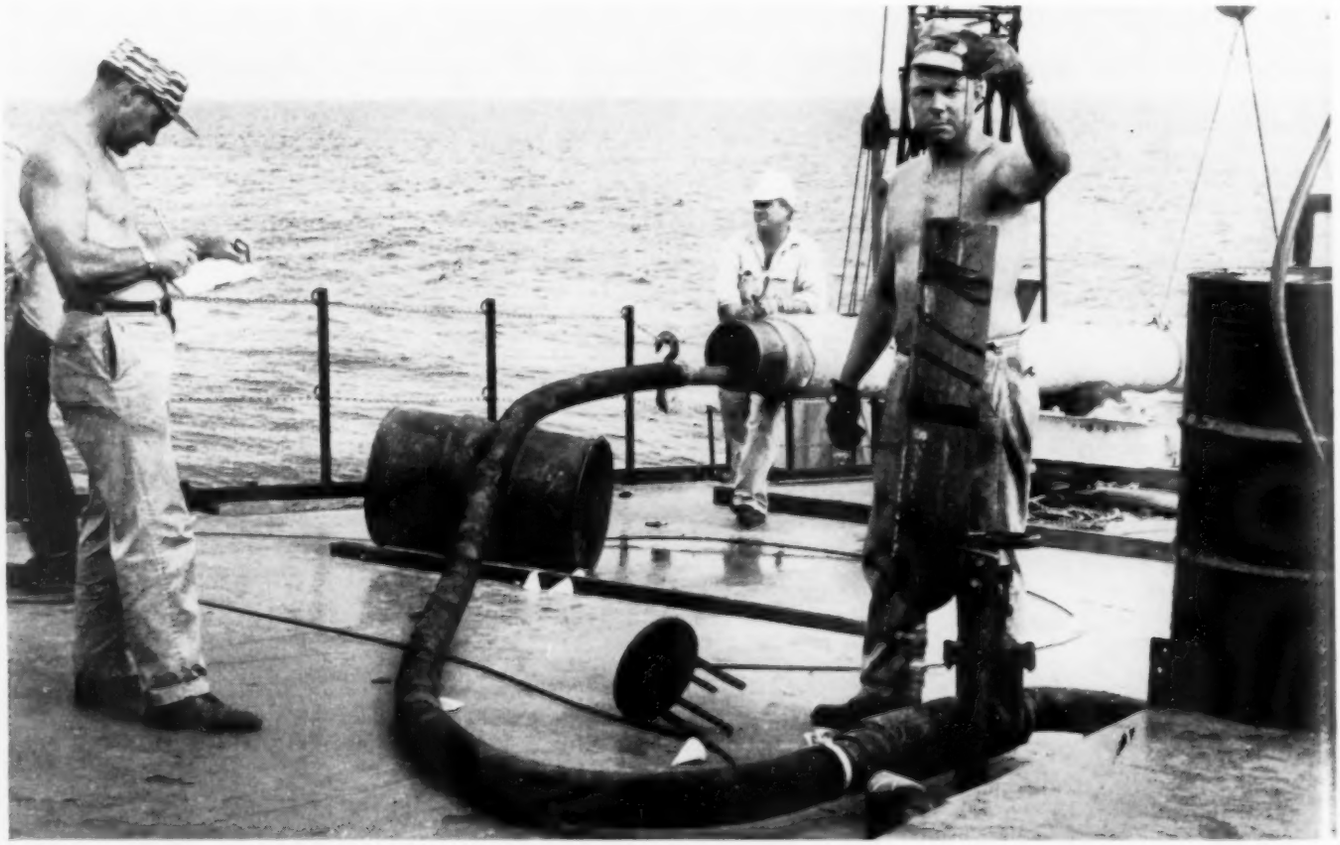
Stringer bead and first hot pass completed at the first station canvas shelters gave welcome shade from hot Gulf sun during the day shift operations.

On the CATC job, the *Magic* has laid pipe in water up to 100 feet deep, at a rate of six joints per hour, and with seas as high as 10 to 12-feet.

Two Cranes Give Flexibility. Pipe is taken aboard from a supply barge

All welds were inspected by X-ray. Developing room is below launch ramp.

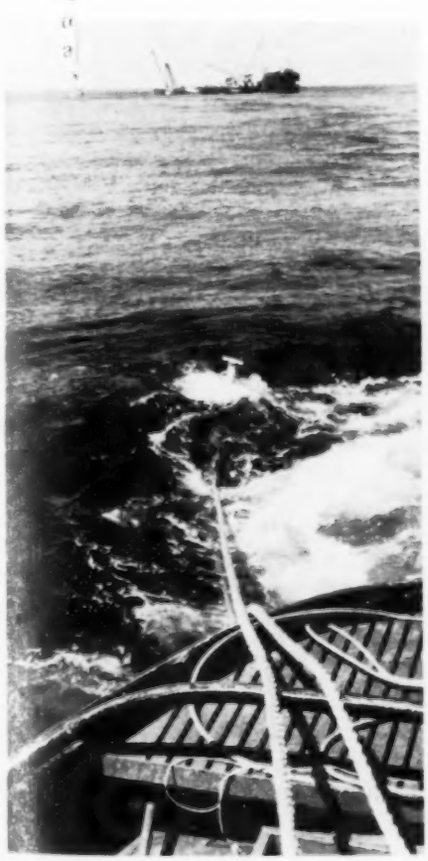
Completed joints were protected by a banded-on field joint form filled with coal-tar enamel. Every joint was "jeeped" for holidays before covering with concrete.



Sea water containing 200 parts per million of organic chemical corrosion inhibitor was pumped into the pipe to stabilize the string as it rested on the bottom before burying. Volume of fill was controlled by pumping pressure and timing.

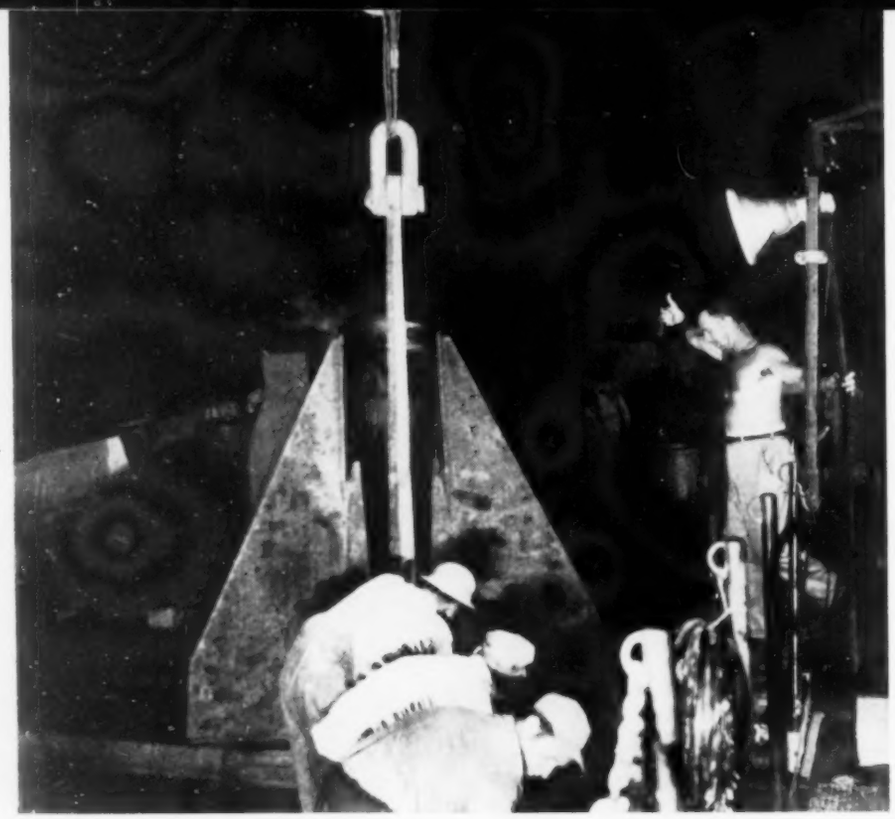
Pontoons are banded to the completed pipe string every 75 feet to give it proper buoyancy and a smooth overbend astern.

This photo shows how the pipe overbend looks from high up on the platform. Pipe touches the 90 foot bottom 480 feet astern.

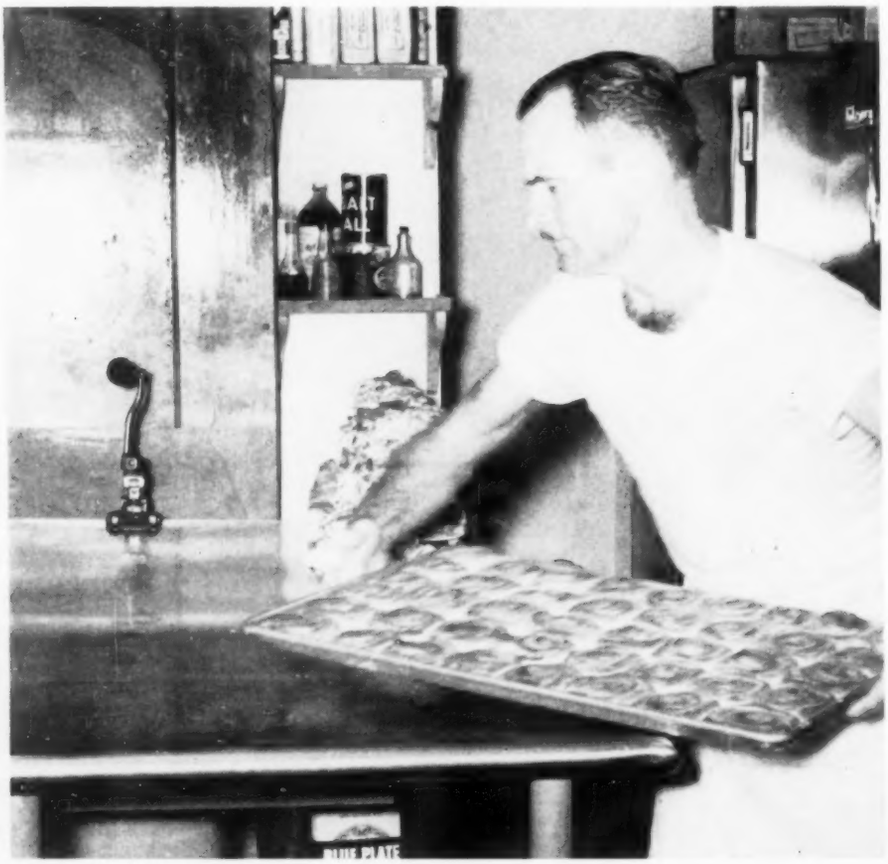


A tug shifts anchors as work progresses. Buoy has 150-ft. pendant line to anchor.

Skin diver inspects anchor on bottom near newly laid 6-inch line. A manila hawser was secured to the pendant line, anchor was lifted clear of the bottom before moving.



"Beefed-up" anchor is hoisted over the side at night to replace one lost when a winch cable parted. To handle the tough anchoring problems in 90-100 foot deep Gulf waters, the regular 4000-pound Danforth anchors were "beefed-up" to 6000 pounds by increasing the fluke area to 4 feet wide at bar and 9 feet long at the point with ¾-inch steel plate. The heavy anchors have held well even in moderate seas during squalls.



Latest in living facilities for the crew are included in the "Magic." This completely equipped galley, plus air conditioned mess hall, staterooms, laundry facilities, sick bay, offices, and recreation facilities make off duty life pass pleasantly.

alongside by one of two 35-ton cranes. By having the two 95-foot boom cranes, it is possible to work pipe from either side depending upon wind and sea conditions. One crane can bring additional joints aboard while the other is used for line-up.

Good boom coverage also enables the crew to shift dope, concrete, and other supplies from barges or boats to any spot above deck, or below, when it is needed. Under normal working procedures the pipe supply barge is located along the leeside.

Winches Move Barge Using 8 "Beefed-Up" Anchors. As work progresses, the *Magic*, moves forward on the pipe line route by winching along on eight anchors. Two anchors are located some 2000 feet ahead of the port and starboard bow chocks. Port and starboard bow breasts and quarter breasts hold the barge on line as it moves forward. Two stern anchors in a similar pattern provide positive control of barge movement at all times.

A tug is used to re-position one anchor at a time as necessary; the remaining seven anchors already set in the bottom hold the barge on location.

Each anchor has 2200-feet of 1-inch steel cable running to its winch spool. Winches, located on the port and starboard sides near the middle of the barge, are driven by 130-horsepower diesel engines through a torque converter. Speed ratios range from 800:1 to 1:1. Deadline cable is 140,000 pounds.

Anchoring in the unpredictable bottoms of the Gulf of Mexico is a tough proposition for a pipe line barge under the best conditions. It can be a nightmare during squalls and tropical storms.

As originally equipped the *Magic* used 4000 pound Danforth stockless anchors. When operating in the soft mud bottom some difficulty was experienced in getting enough holding force against moderate seas so these standard anchors were modified with ¾-inch steel plate webs to give a greater fluke area measuring 4 feet wide at the bar and 9 feet long to the point.

As modified, the anchors weigh about 6000 pounds and can hold the barge on location against an estimated force of 300,000 pounds per anchor. Little difficulty has been encountered in holding location with the new

anchors; on occasion they have buried themselves up to 30 feet in the soft mud bottom.

Tug Shifts Anchors. To handle the anchors by a service tug, each anchor is fitted with a 150-foot, 1⅛-inch steel cable pendant attached to a buoy. To move the anchor the tug throws a manila hawser around the pendant buoy and hauls it out (or in) to the desired location. Where it is necessary to cross over another line already on the bottom, the anchor is first broken free and then lifted off the bottom by a winch on the tug before towing it to the new location away from the pipe.

"Right-of-Way" Buoys Every Two Miles. Lighted buoys marking the 25-foot right-of-way were set every two miles by electronic survey boats. The lay barge moves by sighting on buoy markers, both day and night. As the line is laid, floating flag markers are attached every 800 feet to assist in locating the line for inspection prior to burial by jet-trenching.

The pipe line route had previously been surveyed electronically by Raydist, Inc., using three shoreline transmitter stations and a mobile receiving station aboard a boat. The boat was directed to pre-determined coordinates by the shore stations with a guaranteed accuracy of plus or minus 25 feet.

Bottom surveys and soil analysis were made by taking 12-foot bottom cores at 1500 feet intervals along the route. Seas Engineering and Salvage Company supplemented core data by a stratographic survey over the pipe line route. This instrument reveals dense or hard stratas beneath the Gulf floor. Continuous fathometer readings provided water depths and a bottom profile.

Water Weights Section on Bottom. During construction, the newly laid line is filled with sea water to which 200 parts per million of organic chemical inhibitor has been added. There is never more than a mile of pipe allowed to rest on the bottom without being filled with water. Water is measured into the line by controlling pumping pressure and noting time of fill. Inhibitor is added by injection feeder; concentration is controlled by checking injection rates by dip-stick readings.

Upon completion, the line is to be hydrostatically tested to 1800 pounds per square inch pressure. Following pressure test it is to be walked by a diver. It will then be buried by jet trenching to a minimum depth of three feet below the Gulf floor. Sections of the line near shore will be buried to a depth of 10 feet. Submarine trenching work will be done by Collins Construction Company.

Protective coating system for the CATC line consists of 5/32-inch coal tar enamel, glass fiber and felt wrap. Over this, a 1¼-inch coating of 140 pounds per cubic foot concrete was applied. Coating and wrapping was handled by Pipe Line Service Corporation at its Harvey, La., yard.

Special Riser Design. Platform risers were brought up on the outside of the structure at the mid-point of a platform end where boats do not normally dock. In this way they are somewhat protected from vessel damage; in addition, heavy bumpers are built around the risers.

Space limitations on the platform and operating convenience required that the risers at the central platform be grouped. One bumper, constructed of 12-inch and 4-inch I beams, extends several feet above and below the water line. It fastens to the main platform members and is constructed to facilitate removal for future riser additions.

At the outlying platforms, the single riser was protected by a casing of larger diameter pipe from 10 feet below the water line to about 15 feet above. This casing is attached to a platform leg and structural crossmembers so that it will transmit any shock from boat collisions directly to the structure without damaging the pipe.

Crew Quarters Air Conditioned. Two 12-hour shifts are made up from the 55-man pipe-laying crew. In addition the normal *Magic* crew includes five able-bodied seamen serving under a captain and first mate. Complete living facilities eliminate the need for quarter boats and lost time in getting crews back and forth. Four-man staterooms, washrooms, a completely equipped galley, food storage, and mess hall provide comfortable quarters aboard the lay barge. For the crew's welfare automatic laundry facilities, recreation hall, sick bay, and air conditioned office spaces are provided.

Equipment spaces are located below the launching way: included are a generator room, welding machines, main switchboard, tool room, shop, and an air conditioned X-ray developing room. Electrical power is supplied by two 200-kw diesel-driven main generators and auxiliary generators. Air compressors, air conditioning equipment, fresh and flushing water pumps and additional service equipment are also installed in the midship spaces beneath the ramp.

A radio-equipped house trailer, outfitted as a personnel and material expediting office is stationed at the Grand Isle docks.

Included in the *Magic's* pipelaying crew are 2 ramp foremen, 8 operators, 9 welders, 8 welder's helpers, 5 buffers, and 25 laborers.

Albert C. Cohen is general superintendent of the *Magic;* T. O. May is superintendent. In addition two winch operators, a diver, X-ray technicians, pipe line company inspectors, and mess catering employes are also quartered aboard.

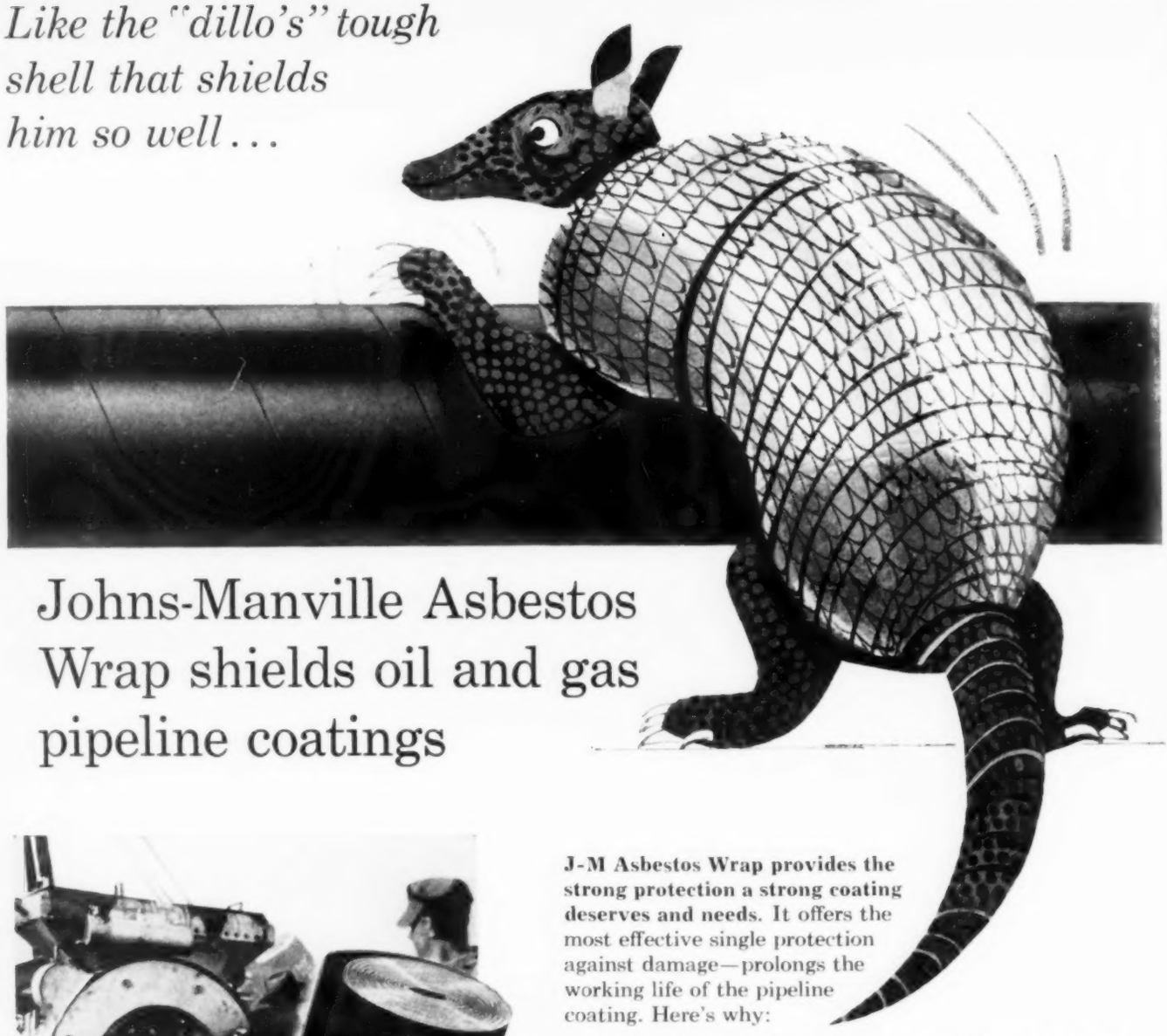
Weather Forecasts Vital. Weather forecasting services have proved especially valuable twice during the *Magic's* operations. The barge was just getting outfitted when Hurricane Audrey hit the southwest Louisiana coast and the barge was moved out from the hard-hit Cameron, La., docks to the Grand Isle location.

A few weeks later when Hurricane Bertha was brewing, early and accurate weather analyses permitted the barge to set the completed pipe string on the bottom before seas reached 16 to 18 feet. The *Magic* moved into sheltered water at Grand Isle to miss the most severe part of the storm. By taking these precautions, it was possible to get back on location quickly with all equipment in operating condition, pick the pipe up and proceed with construction with a minimum of time delay.

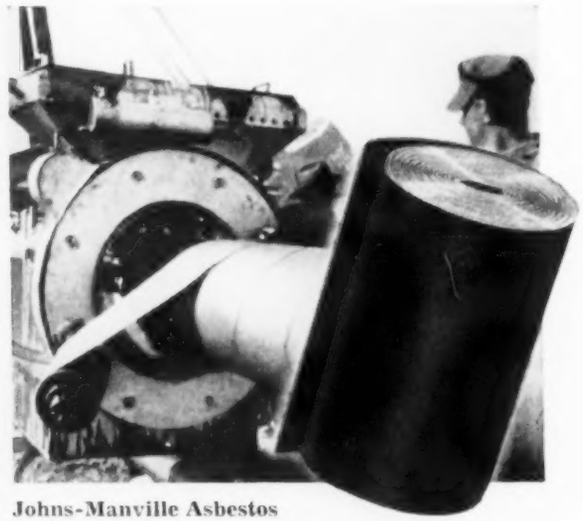
Adverse weather can hike the cost of laying offshore lines. It was found impractical to attempt to lay pipe in seas with swells much over 6 feet. Hurricanes Audrey and Bertha caused shutdowns of seven days each; squalls shut down operations for short periods of time but did not require moving in to sheltered water.

Daily progress varied greatly during construction of the Grand Isle-CATC line depending upon anchoring conditions and weather. In one 24-hour period 5800 feet of pipe was laid. Average rate of construction was somewhat less because of the unusually squally Gulf this summer. —**The End**

Like the "dillo's" tough shell that shields him so well . . .



Johns-Manville Asbestos Wrap shields oil and gas pipeline coatings



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#15 Transhield®—heavyweight asbestos felt with parallel glass reinforcement for high tear strength.

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Johns-Manville PRODUCTS FOR PIPELINE PROTECTION

FIGURE 1—Coring tool is boomed out from the side of the Nu-ideal and readied for dropping. Heavy concrete weights force the core barrel into the soft Gulf bottom to a depth of 8 to 10 feet at most locations.

Offshore Developments

How TGT Guards Against Damage From Hurricanes

Oceanographic surveys predict wave and current effects. Cores taken of Gulf bottom along the offshore route gave needed design facts.

By **John C. Freeman**
Gulf Consultants, Fairbanks, Texas

HURRICANES AUDREY (1957) and Flossie (1956) may have already shown some effects on pipe lines laid in coastal marshes and into the Gulf, but engineers designing Tennessee Gas Transmission Company's new line from Grand Chenier, La., to CATC platforms 25 miles offshore have already anticipated potential storm dangers of the future. An investigation of bottom sediments, waves, currents, and tides formed the basis for its design.

TGT's investigation had three objectives:

1. Determination of the density of bottom sediments to select the amount and weight of coating needed to keep the pipe from floating.

2. Location of shell banks, ridges of Beaumont clay and soft spots along the route of the proposed pipe line.

3. Soundings to find the depth of water.

Results of the field investigation were correlated with winds, hurricane statistics, laboratory tests, waves and tides.

Field survey for TGT's offshore lines was planned by Raymond McAllister of Gulf Consultants, and R. J. Baldwin, TGT project engineer. The following plan was set up:

1. Bottom sediments were sampled to depths of 8 to 12 feet by a piston coring device.

2. Cores taken at intervals of roughly 1500 feet gave a good picture of bottom conditions; more than 200 cores were analyzed.

3. Bottom contours were obtained by means of a suitable fathometer paying close attention to tides during the survey.

4. Since positions to an accuracy of 50 feet were good enough, radio navigation (Raydist) was used for locating the line route and the core points.

5. A stratigraphic echo sounding device was to be used to contour the Beaumont clay which is known to be in the area and also to locate other strata. This was done, but the instrument was not completely suitable for gathering information for pipe line design, and the results were inconclusive. There is a real need for a more suitable device for pipe line surveys of the near future.

Primary contractor for the survey was Sea Engineering and Salvage Company. Locator service was provided by Offshore Raydist and core analysis was done by Gulf Consultants.

Sounding runs were made quickly from the survey ship *Jennings* by running from Continental D-A platform toward a target which was set up by TGT at a shoreline point near Grand Chenier. Positions were computed by Raydist and the echos recorded on charts as the ship proceeded.

Soundings had to be corrected by use of tide information. Since tides are sensitive to the wind, an oceanographic tide analyzer was used to

compute the wind tides used for this correction.

Positions Fixed—Cores Taken Quickly. Proper coring required careful preparation and attention to detail. Since core location points were determined on the *Jennings*, they were marked by buoys thrown off astern at the exact time the location was reached.

Another survey vessel, the *Nu-ideal*, then came up and held location while the core was being taken at that position.

The coring sequence involved these steps:

1. Trigger was set and the coring tool lowered into the water.

2. When the core barrel was several feet from the bottom the trigger was released.

3. As the barrel fell, it penetrated the bottom sediments to a depth of 8 to 10 feet or down to the stiff Beaumont clay.

4. The core barrel was then raised; core and liner removed and the barrel and tool prepared for the next coring operation.

5. As the boat moved on to the next buoy the core was stored with the day's "catch" so it could be transported ashore for complete analysis and study.

Coring Barge Used Inshore. The six-foot draft of the *Nu-ideal* prevented it from working over the inshore bars to take cores and soundings near the beach. A raft with hand operated studs was constructed for this purpose. Weather and waves had to be watched carefully to accomplish this "surf zone" operation. Positions were obtained visually by triangulations from the shore and the cores taken with the same coring tool used at sea.

Nearly every day that the winds were calm enough to allow operation of the coring tool from the raft in a safe manner, it was also calm enough to allow fog to form. Finally a little norther came by and allowed the combination of calm seas and clear air.

Undisturbed Samples Obtained. The piston coring tool used by Gulf Consultants takes undisturbed soil samples 8 to 10 feet in length in any depth of Gulf waters where oil activity is now occurring. When the shear strength of the soil is above 300 psf or fine sand is encountered penetration is reduced.

FIGURE 2—As the core barrel is "triggered" it drops sharply, driving the sample tube into the Gulf floor and obtaining a specimen of the bottom structure.

Samples taken on this survey of the Kinder to CATC line were analyzed in Cameron, La., and College Station, Texas. A field lithology and density analysis was made of each core. Shear strength could have been taken but TGT did not wish to have that measurement observed.

Bottom Structure Effects Protection Costs. Cost of burying the line and effectiveness of the method of protection are highly dependent on the nature of bottom sediments. Sand, shell reefs and hard clays all present their special problems. In addition, soft spots can present problems that cause the pipe to over stress due to lack of support.

From a general geological knowledge of the waters off Cameron Parish, it was known that the hard sand and clay formation called Beaumont was encountered frequently in shallow depths. This hard, dense foundation material was expected to have contour variations of several feet per mile because of the history of its formation. Various sediments were expected to fill in the hollows and cover up the rises in this formation to form a more or less level ocean floor. Overlying sediments were expected to vary greatly in density, lithology and strength.

Lithology, Density Vary. A sample of the field lithology and a general description of the density is shown in Figure 7. Note the variation in the bottom structure in a six-mile section. Contours of the Beaumont clay are striking and the vertical and horizontal variation of sediments is marked for recent deposits. Sand, shell, clay and silt or various mixtures all appear in this short distance.

Hurricanes Influence Design. As indicated earlier the primary reason for the survey was to gain information to help design the pipe line that

FIGURE 3—The barrel containing the core is lifted clear of the water, taken aboard and placed on the deck of the Nu-ideal. A similar coring procedure was used from a shallow draft barge closer inshore.

would stand the forces due to hurricanes. An important part of the survey was to estimate the potential exposure of the pipe line to hurricanes in the Cameron area; and then to make recommendations for minimizing hurricane damage.

Hurricanes hit the Gulf Coast between Corpus Christi, Texas, and Pensacola, Fla., during the "hurricane season" which lasts from June to October. Likelihood of the storms in any given month is shown here.

Hurricane Season on the Gulf Coast
(Corpus Christi to Pensacola)

Month	Total Number of Hurricanes Since 1900
June	4*
July	3
August	8*
September	10
October	2

*Includes Audrey and Bertha in 1957.

Coastal areas of Texas and Louisiana seem to be experiencing a period of several years (5 to 8) in which hurricanes occur after just finishing,

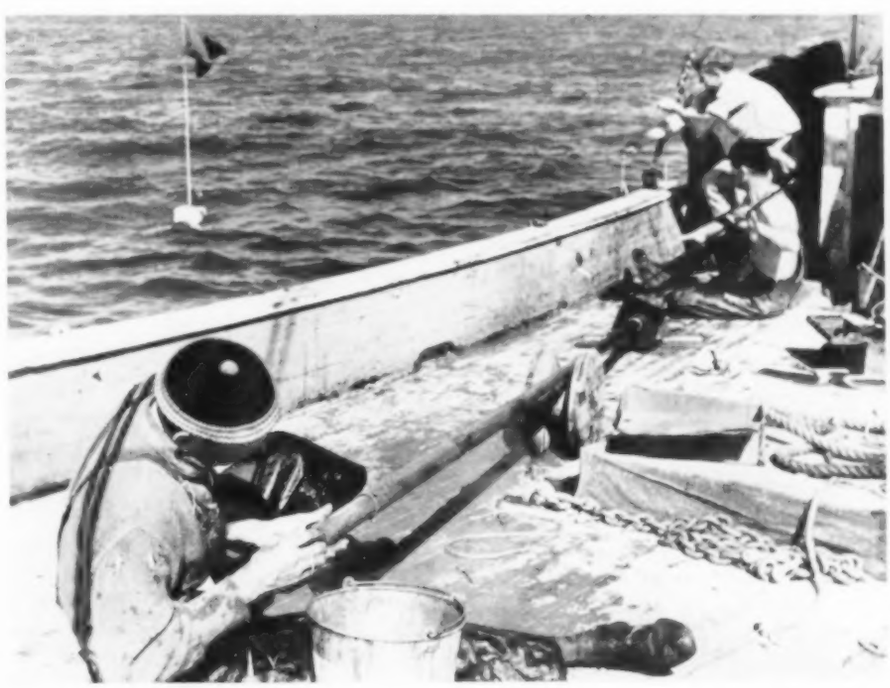


FIGURE 4—Plastic core tube liner is removed from the barrel. A butterfly "check valve" at the bottom of the liner prevents loss of water and suspended materials. Buoy alongside the survey vessel at left marks the coring points previously located electronically.

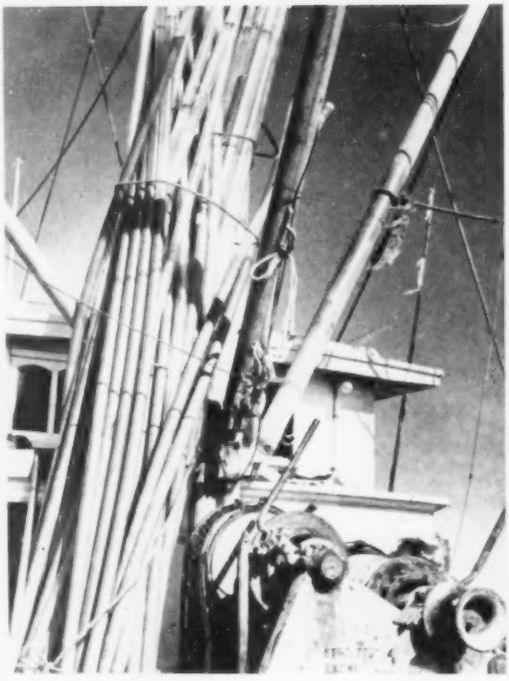


FIGURE 5—Plastic tubes are sealed with numbered cork stoppers and stacked vertically to maintain depth integrity.

FIGURE 6—Location of core points was fixed electronically within plus or minus 25 yards by Raydist. Operator stationed in navigator's charthouse aboard the Jennings signals to buoy handlers at stern when markers should be dropped.

in 1955, a period of six years with no hurricanes.

What Hurricanes Can Do to a Line. A hurricane may affect a pipe line after it is laid or during construction in a number of ways:

1. High waves produce large forces on risers or any other component of the line that is off the bottom. Waves also make work impossible and even staying at the site is often hazardous.

2. Waves produce motion of the water and bottom sediments and wave currents move the pipe if it is exposed. Agitation of bottom sediments can cause vertical motion of the pipe and perhaps cause it to be exposed.

3. Hurricane winds produce currents that scour the bottom in shallow water areas; pipe can be exposed and then moved by these currents.

4. Extremely high tides, such as those occurring with Audrey at Grand Chenier and Cameron can destroy shore installations that are not properly protected.

5. A hurricane will usually interrupt work for at least seven days and if a major disaster occurs (such as at Cameron recently) humanitarian considerations may cause even longer delays.

6. Hurricanes can cause increased construction expense by destroying those service facilities that are usually taken for granted such as hotels, food and water supply, fuel supplies, shop facilities and survey and communications facilities.

From a design standpoint, TGT was primarily interested in the hazards to the completed pipe line. Originally, construction plans did not call for work in the hurricane season.

Wave-Bottom Relationships. Height of hurricane waves is a function of the water depth and the slope and character of the bottom surface. The depth profile for the Cameron area is given in Figure 8. Sediments in that area are known to be rigid Beaumont clay and capable of absorbing little wave energy. This fact was taken into account in computing the waves.

This same figure shows the effect of the water depth on the waves as computed for the TGT survey. Note that the waves are relatively unaffected in the deep water but when shallow water is reached, the waves get smaller and smaller.

Major effect of the hurricane waves on the Gulf bottom and on a pipe line at or under the bottom is through the water velocities produced by the waves. Unfortunately these velocities are not reduced in the same proportion as the waves. For the storm expected once in 50 years, maximum water velocity at the bottom in 60 feet of water is 12 feet per second and in 17 feet of water, it is 10 feet per second. The waves would be 25 feet and only 13 feet, respectively. Since it was well known by the time this pipe line was designed that significant bottom velocities could be caused by waves at all depths covered by this survey, it was already decided that the line would be buried.

Geological History of Gulf Bottom. Knowledge of the geology of the area was an invaluable aid to interpretation of the survey data and in computing the effects of the waves on the bottom. Beaumont clay is a late Pleistocene formation that was probably formed during the last million years in the following manner. During the ice ages, but between period of glaciation, a great deal more water flowed down the rivers emptying into the Gulf. A Deltaic formation was deposited over much of the region between Corpus Christi, Texas, and Vermilion Parish, La. This deposit was several hundred to a thousand feet thick. During the last period of large glaciers the sea level fell about 300 feet and exposed this material. Rivers and creeks cut drainage systems through the material; the sun bleached and dried it into hard pan in many places. Various fluctuations in sea level, some higher and some lower than the present, has re-

sulted in a series of beaches or shore lines with softer sediments in between. This gave a banded structure to the formation in the area and resulted in a situation with great variations in line perpendicular to the shore and relatively small variation in lines parallel to the shore.

As the glaciers melted again, the sea level rose and the rivers began to deposit recent sediments over this hard, dry formation which is called the Beaumont. This clay deposit has a very high shear strength (600-800 psf) and is an excellent resting place for the pipe line when it is shallow enough. The Beaumont is a tough substance to jet into and special preparations and plans are recommended for jetting operations where it will be encountered.

Top of the Beaumont was the terminal point of the samples taken with the piston corer. No effort was made to find the density or shear strength distribution in the formation; it was only identified.

Bottom Survey Effected Line Design. Hazards to the completed pipe line are directly related to the soil characteristics and distribution of the bottom sediments:

1. A sediment can be less dense than the full pipe plus coating and have a small value of shear strength. Here the pipe will sink, probably even without agitation.

2. Bottom sediment can be more dense than the full pipe plus coating and have a small value of shear strength. The pipe will rise with agitation.

3. If the condition described in the first hazard is encountered between regions of firm bearing, the pipe may be subject to excessive stress in spans that will cause it to fail.

4. Sediments may be so soft that agitating waves will mix them with water causing a dense fluid to form in which the pipe may rise or sink.

5. If the sediments are unconsolidated (sand or silt) and the contours are irregular, strong currents can move the sediments and expose the pipe.

Survey Results Provide Definite Recommendations. These factors, along with the diameter, weight and strength of pipe, plus coating selection all contribute to the vertical stability of the pipe line. For the specific line and specifications, the study came up with the following results:

1. All of the sediments in the area were known to have shear strengths great enough to hold up the pipe even if it were filled with water and was much more dense than the bottom sediments.

2. If the pipe were filled with water during laying, then it would be more dense than all sediments and agita-

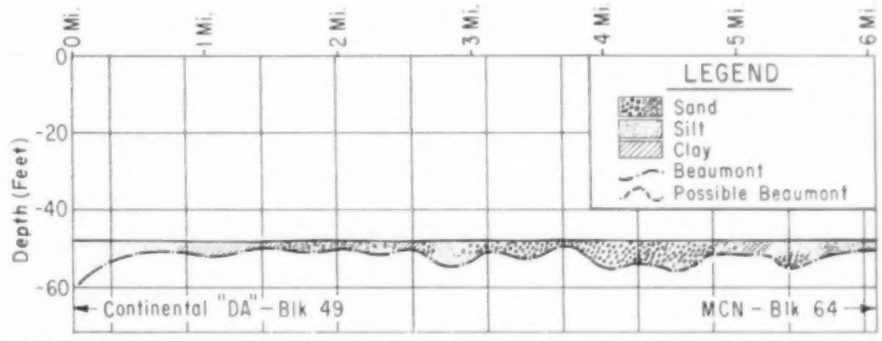


FIGURE 7—Great variations in contour of the Beaumont clay and overlying sediments are shown in this profile of a 6-mile section of the TGT offshore line.

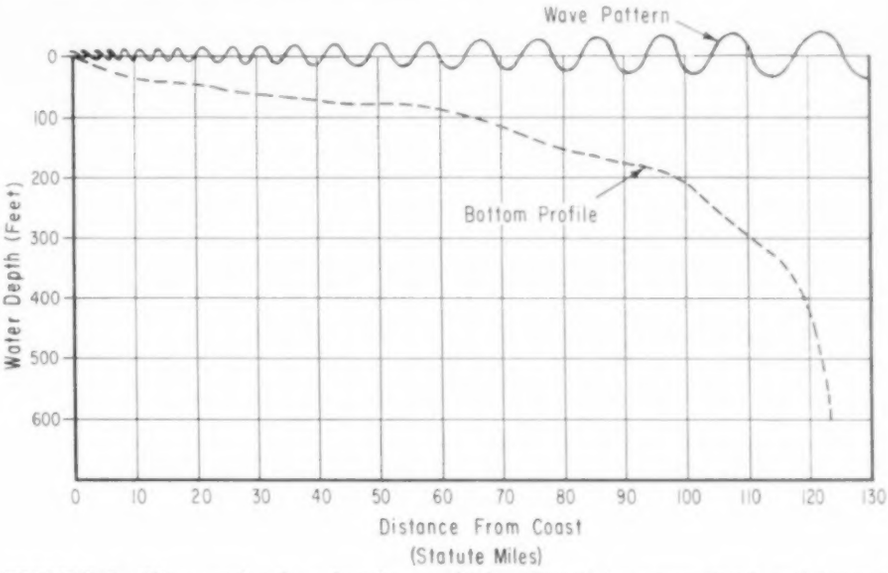


FIGURE 8—Wave action in a hurricane will be effected by water depth and bottom structure. Those waves generated by a tropical storm will not change much in deep water, but as they move inshore to shallow waters they become smaller and decrease in wave length.

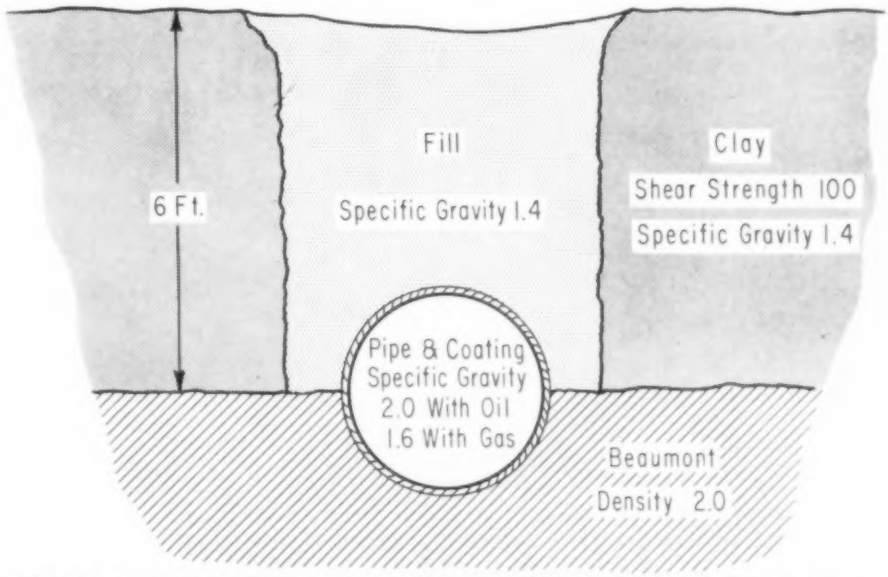


FIGURE 9—Artist's sketch of the ideal bottom features for a supporting bed for an offshore pipe line in the Gulf of Mexico.

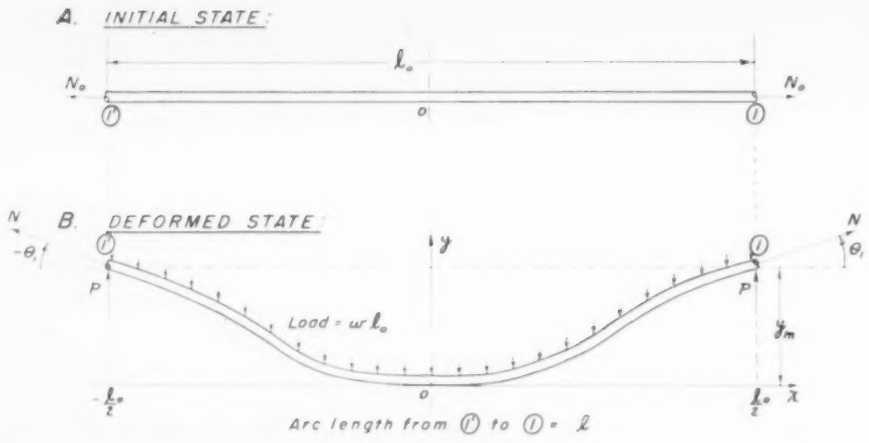


FIGURE 10—Illustration of deformation caused by forces acting on a buried submarine line when it crosses spans of low density, low shear strength material.

tion would not cause it to rise. If it is buried at least six feet while in use, there will be very little agitation even due to a large hurricane and the pipe will be stable.

3. There was no evidence found of soft spots bounded by rigid supports, so if they exist they must be spans of less than 1500 feet. If there were such spans greater than 500 feet the pipe would sink through the sediment and likely reach a firmer foundation before it would rupture.

If the span is less than 500 feet, none of the recommended coatings would give weights great enough to exceed the yield stress except during laying if the pipe were filled with water.

4. The "mud hole," a region where ordinary waves keep the bottom sediment fluid at all times, is some miles away from the site. None of the sediments on the site of this pipe line have these characteristics.

However, an artificial sediment of the "mud-hole" type is created in the trench by the jetting process and by the nature of the soft sediments that refill the trench in a few weeks. If the pipe is six feet down in the trench, the agitation is not expected to be adequate to cause the pipe to move.

5. Scour will occur in the shallow water near the beach at Grand Chenier and it was recommended that near the beach the pipe be buried at least ten feet below the bottom sediment.

Water Velocity Effects at Bottom. Some laboratory investigations were carried out to answer the questions about bottom sediment movements. A tow tank was used to investigate the effect of water motion on various sediments. It was found that sand and silt, or clays with a great deal of silt embedded in them began to move with the water at speeds of one foot per second. At speeds of two feet per second there was a significant amount picked up in just a few seconds. On the other hand, a well consolidated clay was not affected by motion of the water at any speed.

It was concluded that a clay bottom would change shape slowly, not likely by action of a single hurricane but that a sand or silt bottom would change shape in a single hurricane. The pipe trench is likely to lose unconsolidated sediment if it is bounded by consolidated clays. —**The End**

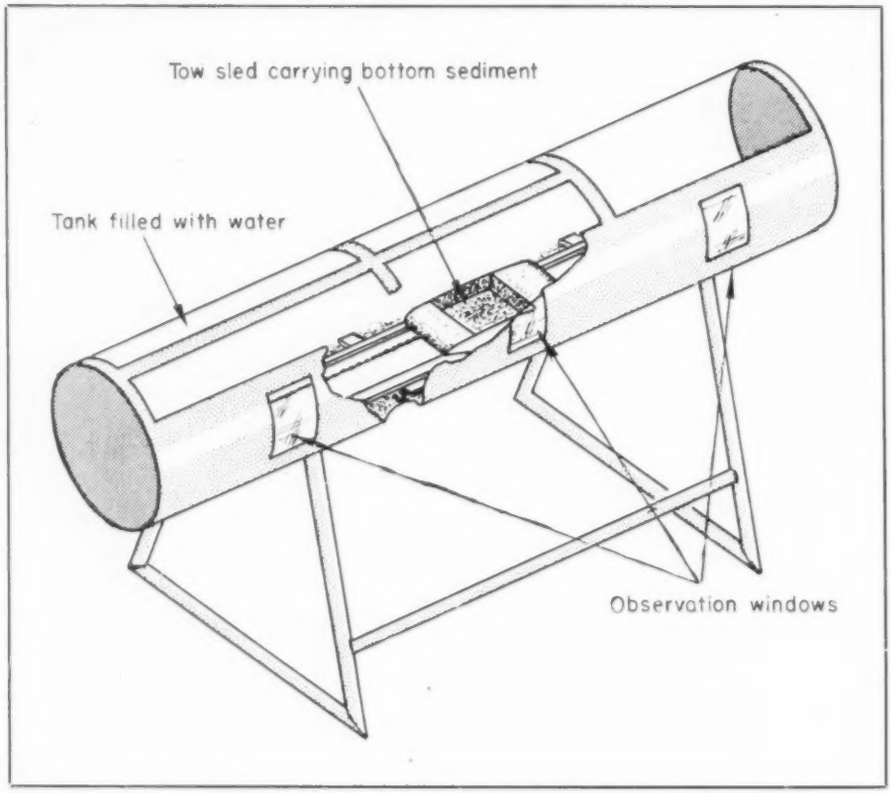


FIGURE 11—Tow tank used for laboratory study of sediment movement with various velocities of water flow. Streamlined cart was towed through pipe filled with water; speed and sediment behavior were observed by a movie camera.

About the Author

JOHN C. FREEMAN has gained a thorough knowledge of the behavior of the Gulf of Mexico and its effect on submarine pipe lines. His firm, Gulf Consultants, was assigned the work of making studies of the bottom structure, waves and tide conditions along TGT's new line off Cameron, La. Dr. Freeman studied mathematics and physics at Rice Institute and has completed graduate studies in meteorology and applied mathematics at California Institute of Technology, Brown University, and the University of Chicago. He was a weather officer with the U. S. Army Air Force from 1941 to 1946 and has been active in several research projects in meteorology and oceanography at Texas A and M. He has written a number of papers on these research projects and compiled several confidential reports for pipe lines, marine construction firms and shipbuilders.

Twenty six-inch pipe is launched from an inclined ramp on starboard side of lay barge. Barge which is largest in service has been laying up to 2500 feet of big-inch pipe a day. Controlled buoyancy "stinger" establishes overbend as pipe is laid astern.

Offshore Developments

Advanced Designs Featured on Giant Barge

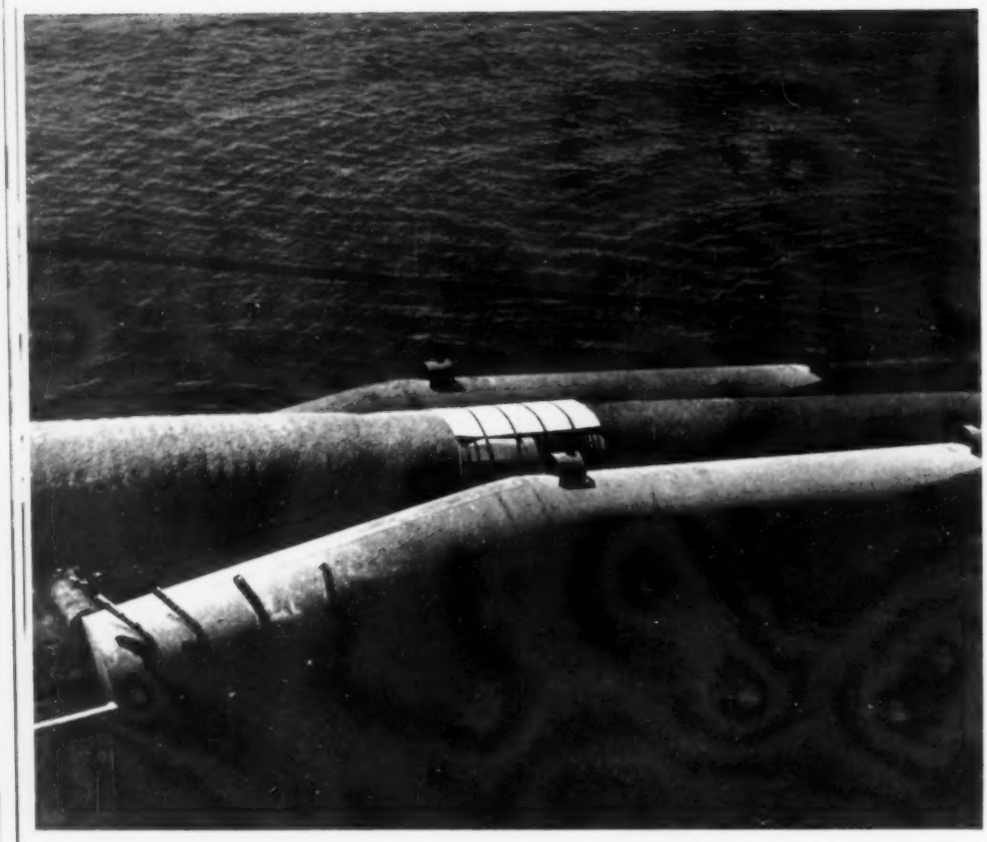
Cradle lowers pipe to bottom on new lay barge. New feature prevents damage to pipe coating and eliminates attaching and recovering pontoons.

By John C. Watts
Engineering Editor, Pipe Line Industry

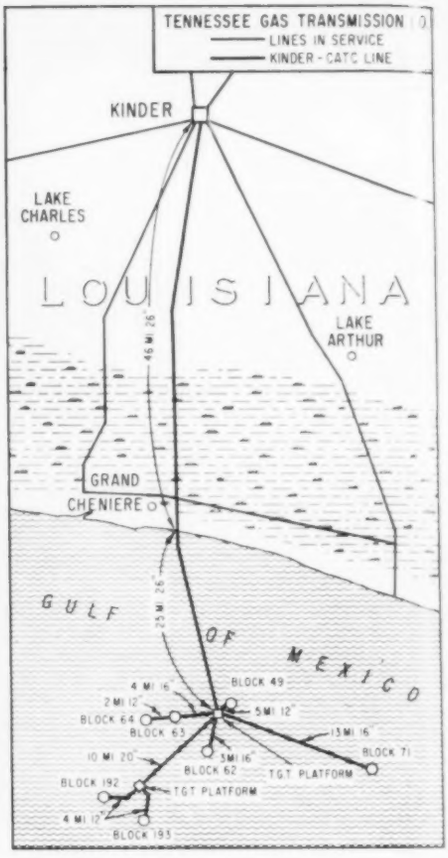
THE GROWING challenge of laying larger and longer marine lines is bringing about design of larger and more complete lay barges. Brown & Root recently placed in service their new barge, the M-211, which is serving as a proving ground for several new ideas in marine pipelining. Among the new features are a hydraulic leveling device to aid in line-up of joints, and a controlled buoyancy "stinger" to control the angle at which the pipe enters the water.

Now laying a 26-inch gas line for Tennessee Gas Transmission Company, the M-211 is the largest barge in the marine pipe laying fleet. Weighing about 1250 tons, it is 300 feet long, 60 feet wide, and 19 feet deep. Ballasting is provided to allow varying the draft according to water depth. The minimum depth in which the M-211 can work is six feet. Its stability will allow pipe laying to continue in seas with waves up to six feet. Progress to date has averaged about 2500 feet a day.

Hydraulic Jack Levels Pipe. New joints of pipe, after being positioned by a side boom tractor, are leveled by a hydraulic leveling device. Controlled by one man, this support offers better control during the line-up operation and while making the first weld. Future plans call for all pipe handling on deck to be done by conveyor system and addition of more



"Stinger" cradles pipe as it leaves the barge. Extending 356 feet from the barge, controlled buoyancy of the "stinger" provides the proper overbend.



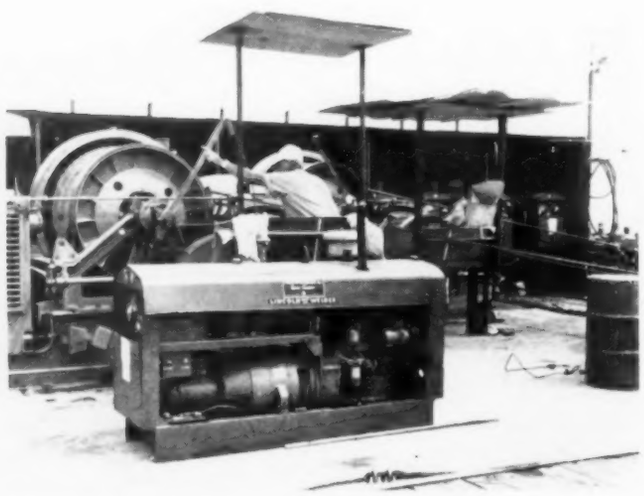
TGT's Kinder-CATC line and related gathering lines to serve offshore platforms.

hydraulic devices. Improvement of those facilities will make handling the 40-foot joints of pipe semi-automatic after the pipe is in the deck storage area.

"Stinger" Gives Proper Overbend. One of the most unusual features of the barge is a new method of providing proper overbend to the pipe as it enters the water. The usual procedure is to support the pipe with pontoons which help buoy the pipe until it reaches the bottom. Additional work is involved in cutting the pontoons loose and recovering them.

Brown & Root's Pipe Line department designed the "stinger" which controls the overbend. The "stinger" is a cradle with controlled buoyancy extending 356 feet from the barge. It allows the concrete coated pipe to be lowered to the floor of the Gulf on a gentle slope. This is the first time such a device has been used in submarine pipe construction and has proved very satisfactory.

Quarter Boat Houses Crew. Two 45-man crews, working 12 hour shifts, are required to man the barge. The men are housed on a quarter boat



All equipment is located on open deck. Four double-drum winches handle anchor lines. Welding machines in background.

Joint of pipe is positioned by side boom. Crane moves pipe from storage to transfer rack where tractor picks it up for alignment.

A fleet of 21 barges and eight tugs is required to support the three lay barges. Pipe and supplies remain on the barges until needed, allowing maximum working space on deck.

which has facilities for 100 men. The quarter boat has been docked at Grand Chenier, La.

All Equipment Located Flush on Deck. At present all equipment is located on the deck of the barge. Covered shelters house welding machines and office space. All other equipment is in the open. A tractor crane which can be moved the entire length of the barge handles all lifting. Four double drum draw hoists with 50,000 pounds pull handle the anchor lines. Pipe and other materials are left on barges anchored along side the lay barge until needed. Space for only a few joints of pipe is provided on the deck.

Below deck are spaces made up of compartmented tanks around the shell of the barge. These tanks are used for ballasting and as storage for fuel and fresh water.

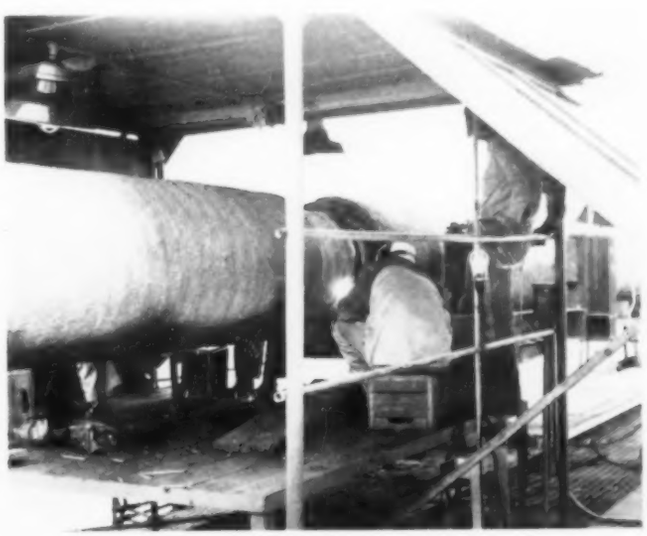
Tugs Shift Anchors. The barge is positioned and held stable by eight 8000-pound anchors. Each anchor is attached to barge winches through 2000 feet of 1½-inch anchor line. Six of the anchors are used to pull the barge forward, with the two stern anchors holding it in position. Tugs are used to move the anchors when necessary. Movement of the barge, and anchor shifts are controlled from a lookout tower directly over the pipe ramp, about midway between the bow and stern. Flagged buoys mark the right of way. Progress of the barge is controlled by sighting these flags.

Pipe Laid from Inclined Ramp. All welding and other operations are done on an inclined ramp on the starboard side of the barge. Covered stations house five welding positions, X-ray station, and location for plastic tape wrapping of the joints. An additional uncovered station is provided for concrete weight coating of the joints.

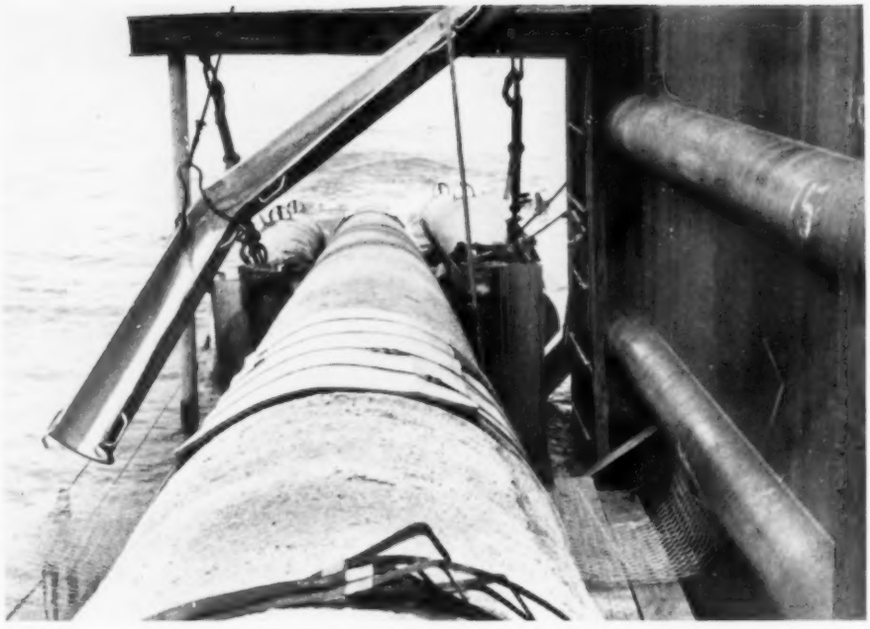
The loading crane transfers the pipe from storage on deck to a transfer rack. A side boom tractor is used to position the joint on the leveling device at the top of the ramp.

After each station completes its work on a joint of pipe, the barge is moved forward and another joint added. Plastic tape is applied to the joint after the weld is completed and

Joint is leveled by a hydraulic support. Plans call for addition of a hydraulic system to perform all pipe handling on barge deck.

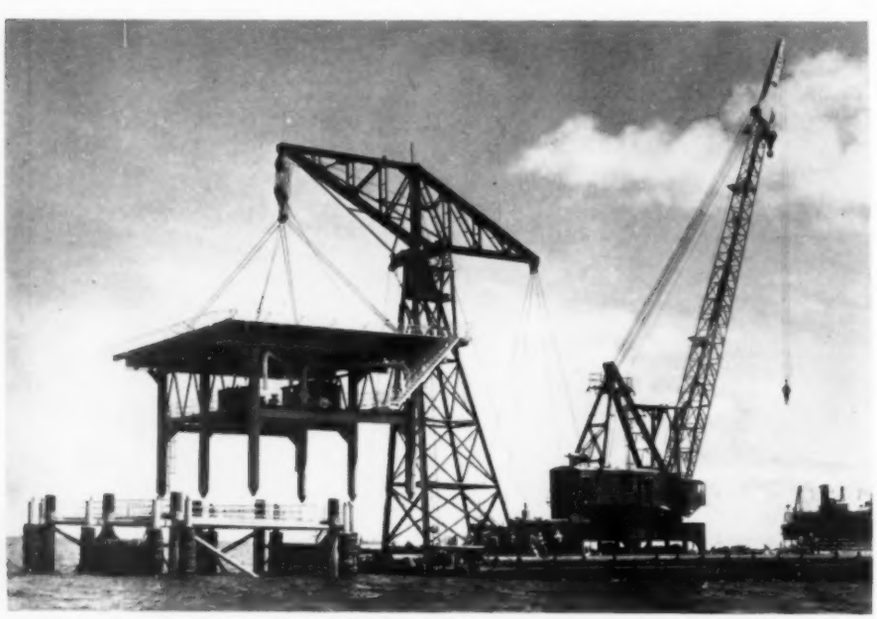


Covered stations provided for welding, X-raying and joint coating. Expanded metal deck outboard keep work area clean.



Concrete weight coating is applied at the final station. Trough transports concrete from the mixers on deck. Fiberboard forms around the joint are filled from the trough.

Inclined ramp of lay barge gives proper angle to provide smooth entry of the pipe in the water. Pipe is supported on the ramp by rubber rollers.



Platforms which will serve as junction points for the gathering system were pre-fabricated in Houston. A derrick barge lifts one of the platforms into position in Block 49.

X-rayed. A primer is used under the tape. At the last station on the ramp, a fiberboard form is wrapped around the pipe and the weight coating is applied.

Builds Largest Offshore Gas System. The M-211 along with two smaller barges are building the most extensive offshore gas gathering system yet designed. Located off Cameron Parish, La., when completed it will add approximately 1.7 trillion cubic feet to TGT's natural gas reserves.

Consisting of approximately 107 miles of 26, 20, 16, and 12-inch pipe, the system will connect offshore producing wells with TGT's compressor station at Kinder, La. Brown & Root has the contract for the offshore portion of the system, which consists of all but 46 miles of the 26-inch trunk line. The land portion of the 26-inch line is being laid by Sharman, Allen, Gay, and Taylor and by Grayco Constructors.

Included in the offshore portion are two platforms which will serve as junction points for the lines. Gas will be gathered from platforms in CATC Blocks 49, 71, 62, 63, 192 and 193 and from Magnolia-Continental-Newmont Block 64. Approximately 44 miles of pipe will be required for the gathering lines in addition to the 26 miles of trunk line offshore.

Platforms Prefabricated. Both the jacket and the deck sections of the junction platforms were prefabricated in Brown & Root's Houston yard and barged to the location. The jacket is set in the water and piling driven through hollow legs into the Gulf floor, giving the structure stability. The deck is then lowered into position on the jacket.

Operations Directed from Lake Charles. Operation of the three barges is being directed from Brown & Root's Lake Charles, La., office. Coy Spears is the spread foreman with supervision over all three barges. In addition, a barge foreman is stationed aboard each lay barge. Each foreman is qualified to control the movement of the barge, eliminating the necessity for an additional man. A fleet of 2 barges and 8 tugs is required to support the three lay barges.—**The End**

Blow-case is located at tank nearest pipe line pumping unit. Blow-case is most feasible where producer gas is available.

Blow-Case Eases Work for Gagers

High pour point oil can be cheaply and easily moved with field gas using "blow-case." In many cases pumping units can be salvaged.

Interstate Oil Pipe Line Company has developed a new method for handling high pour point oil. Long a thorn in the gager's side, high pour point oil will congeal at atmospheric temperatures in many cases. Use of a blow-case to start the oil moving, has relieved the gager's work load, and in some cases can show a real economic pay-off by replacing pumping units.

Producers keep high pour point oil from congealing in their tanks with agitators or heated coils in the tanks. When this oil hits suction lines to the pumping units, it is difficult to maintain sufficient suction pressure to fill the pump. Frequently portable booster pumps must be attached at the lease tanks to get the crude to the pumping units. Starting the oil moving at one lease may take a couple of hours or more.

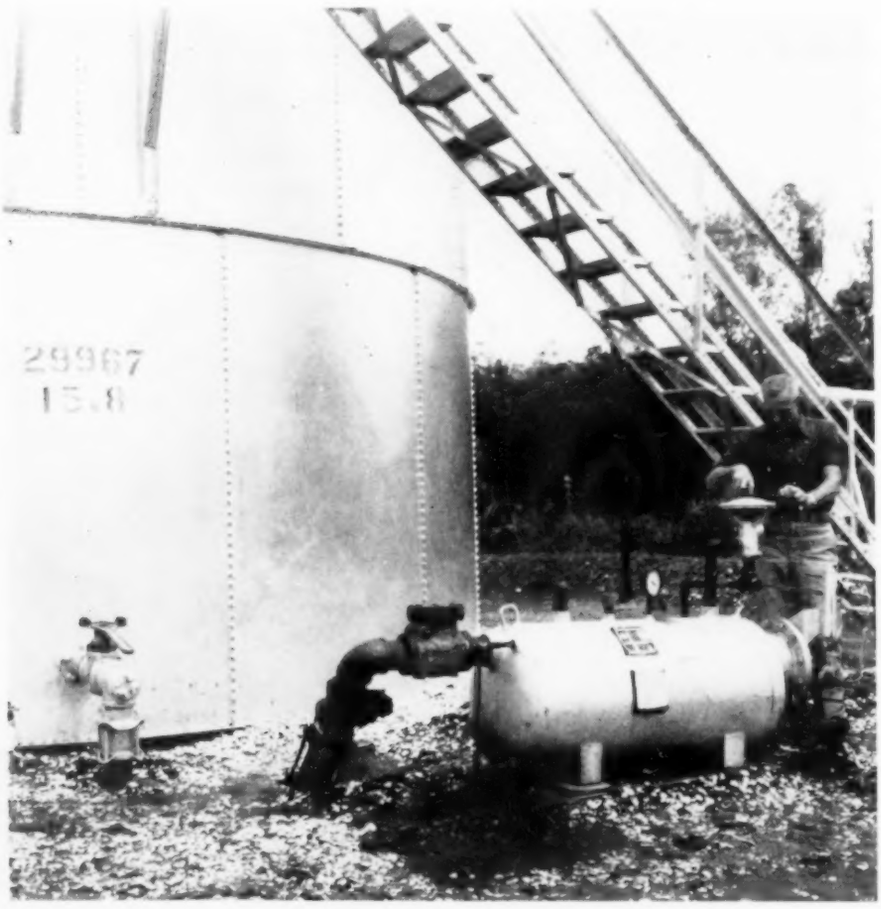
When gas is available as a by-product of the field, it can be used as a jet to clear the suction lines of old oil before running the new. Extra steps between tank and pump, and the time-consuming operation of clearing the pump of gas are often required.

Old Oil Easily Cleared With "Blow-Case." Operating on the same principle as a pump, the "blow-case" saves time and money where high pour point oil must be handled. The blow-case operates most economically at locations where gas is supplied by the producer, as in Franklin field, Louisiana, where Interstate developed the idea.

Consisting of a cylinder about four feet long and two feet in diameter, the blow-case is installed as close as possible to the tank in a battery nearest the field pumping unit. When the tank valve is opened and the heated or agitated oil reaches a certain height in the case, a three-way valve closes the vent exhaust line and opens the gas inlet line. One hundred pounds of gas pressure is applied to push the oil from the cylinder into the suction line. A check valve prevents gas from backing into the tank line. As the oil in the blow-case drops from the gas pressure, the gas supply closes off, the gas is vented up into the atmosphere some distance away, and the case starts filling up again with oil. This cycle is repeated until the high pour point oil reaches the pumping unit, the time varying with length of the suction lines.

After turning on the blow-case, the gager goes to the pumping unit and

Initial cost and maintenance on portable pump is higher than that on a blow-case which features simplicity in design and operation.



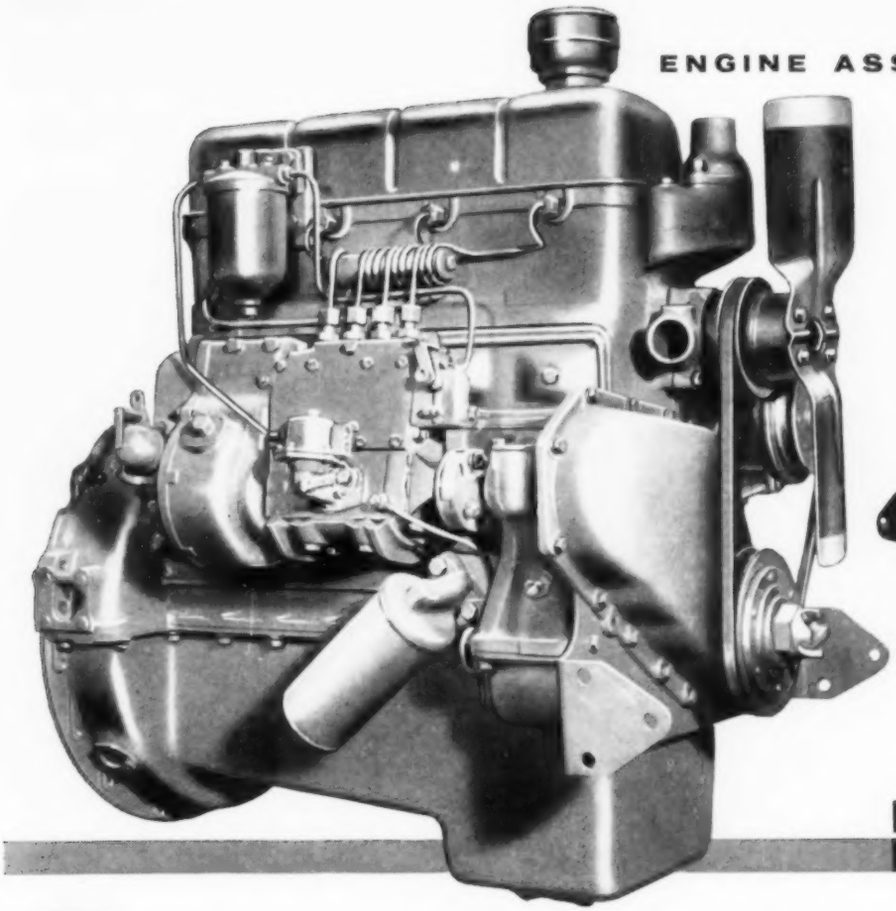
Gager opens gas valves on blow-case to move oil from lease tanks to the gathering line.

starts it, bleeds it and then returns to the blow-case and shuts it off. In the Franklin field installation, the operation takes the gager about 30 minutes to put the lease on Interstate's line, whereas, it formerly took about two and a half hours using a gas jet system.

"Blow-Cases" Eliminate Pumps. With blow-cases operating successfully on suction lines at two leases in Franklin field, Interstate is planning to extend the attachment's use by converting three discharge lines to suction lines. Blow-cases would replace three pumps on these lines.

A blow-case installed comes to about $1000, and costs $100 a year for maintenance. A regular booster pump installed is $1600, with $500 required yearly for maintenance. The blow-case uses twice the gas of a conventional booster, but in the case of producer-supplied gas the charge is nominal.

Construction savings also are seen as a result of blow-cases. It's contended that smaller suction lines could be laid on some leases, with the difference being enough to buy a blow-case and fittings. —**The End**



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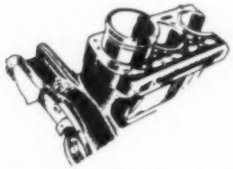

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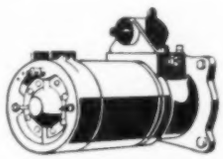

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Type		4-Cyl. Diesel
Bore and Stroke—Inches		3 93 x 4.52
Displacement—Cubic Inches		220
Brake Horsepower	Dynamometer	60 @ 2250
	Continuous	48 @ 2250
Torque	Dynamometer	151#' @ 1600
	Continuous	121#' @ 1600
Compression Ratio		16 to 1

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FIGURE 1—This is an example of what can happen when a tank is not gas tight, lightning-proof and correctly vented. Most modern tank fires result from failure to meet these standards.

Fire Fighting Fundamentals

Using the Graded Risk Wisely

Use of the graded risk in fire protection is resulting in tremendous savings for the oil industry.

By J. L. Risinger
Maplewood, New Jersey

GRADED RISK, sometimes termed calculated risk, does not apply to people, only property.

Such risks cannot be taken on people because no amount of expenditure can restore or pay for a man's life. However, in many instances property can be rebuilt, or damage repaired at less cost than is required to protect it.

When applied to fire protection in petroleum operations, graded risk is defined as a method of calculating the probable fire loss and providing fire protection that will save more by reducing this loss than the expenditure required to obtain it. This calculation cannot be based on the value of the property alone. However, this should be one of a number of things to consider.

Fire prevention and fire control, as well as fire extinguishment, should be taken into consideration in calculating the justification for protection expenditure. For clarification of intended meaning of terms:

1. Fire prevention includes the features built into a unit, structure or property to permit it to be operated, used or occupied under designed conditions, without failure from foreseeable causes. It includes construction, engineering and equipment standards, layout, unit spacing, allowance fo

orrosion and wear, and correct procedure in its use.

2. **Fire control** includes handling and control of fires to prevent their spread by design, layout spacing, construction, and the providing of control equipment.

3. **Fire extinguishment** is the phase which becomes involved after a fire starts. It includes, of necessity, the ready availability of qualified personnel, equipment, and supplies with which to extinguish the fire.

4. **"Fire Protection"** includes all of the phases defined which are under fire prevention, fire control and fire extinguishment. Confusion has been caused by the use of this term in organization definition to include only fire extinguishment.

In providing fire protection on the graded risk basis, one phase must be balanced against the other to strike the balance of potential fire loss on which to establish the risk.

Why Use the Graded Risk? As fire possibilities have been reduced and better control measures established, fire protection on the graded risk basis has become more and more economically justified. Some of the regulations that were adopted and certain equipment that was required in the days of less effective fire control are no longer justified or needed. Even so, in some cases it has been difficult to remove out-dated requirements to keep in step with progress.

Many illustrations could be given in which better prevention and control has increased the graded risk justification or removed certain requirements from the needed classification even on the graded risk basis. Typical among these illustrations is the petroleum storage tank.

In the early days of the oil industry, seldom did an electrical storm occur but that it left in its wake one or more petroleum storage tanks sending their flames and black smoke into view of the surrounding community. But this was in the days of the wood and other type roof tank that was not gas tight, lightning proof, and correctly vented. Some of these fires still occur where tanks do not meet these standards, thus detracting from the effectiveness of the standards when tank fire frequency is calculated (Figure 1).

Questions to be Answered When Considering the Graded Risk:

1. What are the fire possibilities and how are they compensated for?
2. What are the chances of injury or death to people should such a fire or explosion occur?
3. What property would be exposed to loss or damage, and how much would be the loss in operating time?
4. What would be the consequences from human failure and are workmen trained against these errors?

The frequency of such fires at one time was such as to justify considerable expenditure for fixed fire fighting systems, extensive diking, wide spacing between tanks and in the case of crude oil, extensive provisions against boilover, which invariably occurred when a crude oil tank took fire.

The advent of the correctly vented all-steel gas-tight cone-roofed tank has decreased fire frequency, thus reducing the justification for fire protection to the extent of exposure to fire in nearby facilities. This is in the case of low flash point oil storage in tanks with venting devices that are normally closed when not under pressure or vacuum.

Floating roof and other vapor conservation type tanks have further reduced the justification for additional fire protection expenditure.

It is now common practice to accept the calculated risk of infrequent total loss of tank and contents, rather than to attempt equipage for 100 percent extinguishment in case of fire. This is in accordance with the theory that if tanks are correct it is much cheaper to allow one in a great number, over a long period of years, to burn to consumption than to equip all of the tanks to be sure of extinguishment should one catch on fire.

One company has more than 2000 marketing tanks in an area. To fix foam on all of these tanks would cost a few million dollars. They are all-steel gas tight, and the low flash point oil tanks are vented with devices that are normally closed when not under pressure or vacuum. No fires, except small ones at vents and during cleaning, have occurred in any of these tanks since being so equipped more than 35 years ago. There is no question but that these tanks can well continue on the graded risk basis.

On the other hand, there is no assumption of graded risk in the case of storage tanks through not providing extra grounding for tanks. It was once thought that grounding prevented the tank from being ignited by lightning, and the oil product from being ignited by static electricity charge build-up on the surface faster than it could normally bleed off to the shell of the tank. It was found by long experience and many tests that such extra grounding of tanks served neither of these purposes. Therefore, where failure to ground the tanks was once considered on the graded risk basis, it has been removed to the category of simply not affecting the case whatsoever.

It can be seen by the foregoing illustration that progress has not only justified fire protection on the graded risk basis, but has also pushed some things off of the graded risk basis into the no purpose classification. Other examples could also be cited.

Specific Applications. It is possible for a tank farm to be so built and operated that no fires will occur. It is also possible for manpower, materials and fixed fire fighting systems to be provided and measures taken so that any fire that does occur can be extinguished with little or no property loss or damage. However, no company can afford to do either, and most assuredly not both. The expenditure required in either case would far exceed the savings in fire loss.

However, in a station, people are more likely to be involved, especially in the case of fires caused by rupture of lines or fittings.

It is evident that the chief risks in a station are the pumping units themselves. In these units, the fires would be hard to control, except by previously providing:

- Drainage to separators and valves.
- Devices by which to stop the flow of fuel to the fire.
- A way to protect the structure from deterioration during the fire.

In calculating the risk on these units one major cost does not appear in the financial records of fire loss experience. That important factor is lost operating time.

In light of the above facts, when considering fire protection on these units very little, if any, calculated risk can be taken to prevent the incident itself because of the possibility of injury to people and the importance of keeping the unit on stream. There are five important factors to consider in preventing such incidents:

1. Original design against explosion.

2. Construction against required maintenance, leakage, and spillage.

3. Provisions to stop and evacuate the fuel that would feed the fire.

4. Provisions to keep the structure protected by cooling during the fire.

5. The training of operators, not only in how to operate, but also in the safety features, hazards of opening or closing the wrong valve or failure to open or close the right valve.

A pertinent question, especially in a station, is the justification of fixed spray or deluge monitors. This can sometimes be calculated on the basis of how quickly the pressure of gas can be reduced, flow of oil stopped and what damage will be done in the meantime.

Of chief concern is whether the fire will weaken or topple the structures. Fire proofing of structures are to be taken into consideration. Most assuredly cooling water is needed more quickly in the case of possible gas blast fires against structures than if the break or leak involves oil.

Difficulties in Applying the Graded Risk. The difficulties in the carrying out of a graded risk policy are many. On the one hand some tend to take too much risk, even to not giving enough consideration to the probability of injury or death to employes.

Many safety and fire protection men cannot afford to advocate the graded risk policy too strongly because of the tendency of some to take such as an encouragement to go too far toward no protection where protection is greatly needed, or to reduce provided protection to ineffectiveness or inadequacy. In their zeal to save the company money, some are likely to fall into this tendency.

Also, some safety men are on the spot in this graded risk policy. When a fire does occur, the failure is his, even though the loss has been paid for many times in not spending money on the prevention or means of ready extinguishment of the fire on all of the type risks. He receives no credit for a build-up of savings over and beyond the specific loss.

On the other side of the picture, some tend to base the graded risk strictly on the basis of the value of the specific property—not taking into consideration the fire possibility, control of the fire by other means, and the calculation of the expenditure that would be incurred should the company so protect all of the same type risk throughout its total properties.

A refinery warehouse fire a few years ago brought forth a management suggestion that automatic sprinkler systems should be placed in all warehouses. A survey was made of the cost to install these systems on all of one company's warehouses in all departments. The cost was estimated to be approximately $7 million.

Assume that such a system would extinguish all warehouse fires. In the calculation of losses during the past 30 years, including loss from the fire mentioned, it would take the systems 250 years to pay out. In the meantime, replacement and maintenance would extend this payout time indefinitely.

In the case of this particular warehouse fire, the sprinkler system on the third floor did greatly assist in the prevention of the spread of the fire to valuable adjoining property. This sprinkler system was, therefore, justified on the basis of the calculated risk, but did not prove the justification of sprinkler systems on all but a very few warehouses.

Sometimes a fire will throw the graded risk entirely out of balance because of conditions completely unrelated to the fire itself. Immediately after one serious explosion and tank farm fire, many vapor proof refrigerators were sold. These, of course, may be needed under certain conditions, but they had no relation to this fire whatsoever.

Many cases could be stated where a completely off standard, bad roofed tank caught fire. As a result, requirements on standard tanks that would never become ignited were extended unnecessarily.

Progress Must Be Recognized. The greatest difficulty in the application of the graded risk is in failure to recognize improvement in equipment and methods of control which reduce fire possibilities to remoteness. In some cases, 100 times as much money is spent preparing to extinguish fires in the total risk as the loss would be if the individual items of the property that do catch fire were allowed to burn to total loss. In other cases, fire losses have far exceeded those which would have been justified and paid out had possibilities brought about by new methods been recognized and protection provided accordingly.

The providing of fire protection on the graded risk basis is perhaps the greatest challenge confronting the fire protection man. In some cases, those for whom he works want to see an elaborate fire protection set-up, but do not have the time to keep up with the detailed facts in the case. In other cases, they want justifiable expenditures only, but when the fire occurs they want those expenditures to have been paid for many times.

There is also a tendency to rate fire protection effectiveness on the basis of the lowness of the fire loss only, with no consideration to the graded risk in the over-all picture. Another factor to consider is the public fear of an oil fire. If a company carries outside insurance, this must be taken into consideration.

In spite of the difficulties, the policy of providing fire protection on the graded risk basis is progressing to the point of creating tremendous savings for the oil industry. —**The End**

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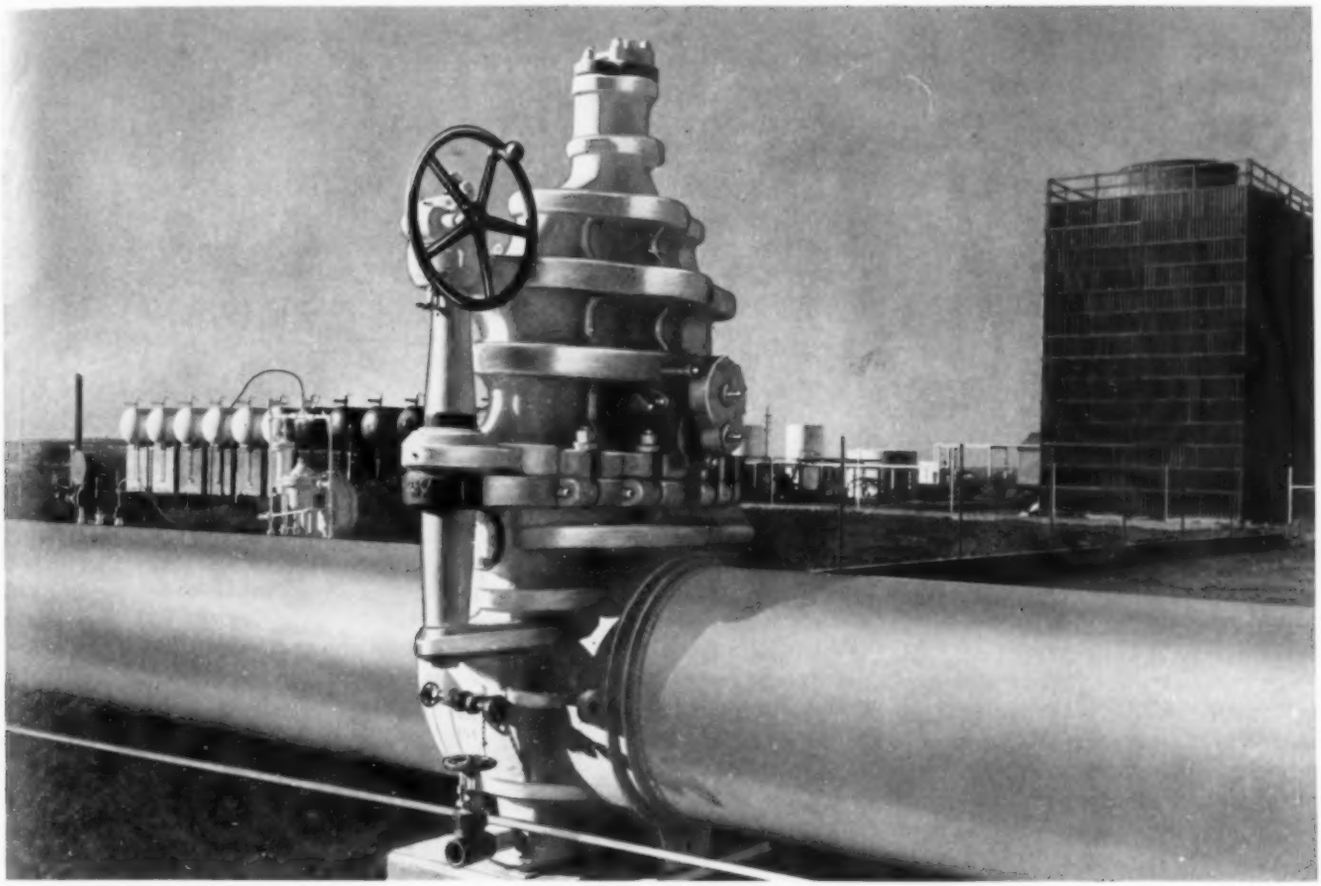

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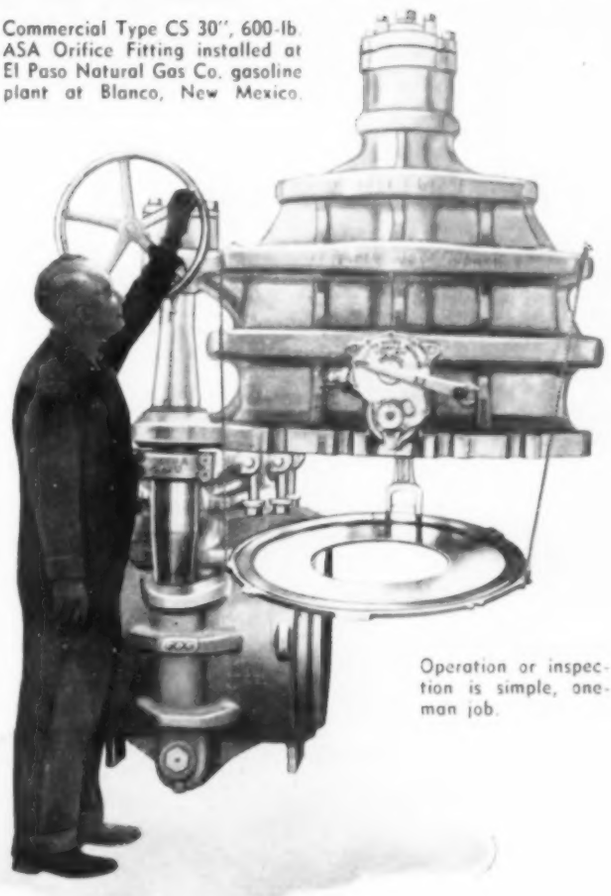

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Four Steps to Successful Training

Here is a training formula tailor-made to meet every pipe line company's needs.

By Carl Mullins White, Service Pipe Line Company
Tulsa

THE PURPOSE of any training effort is to effect certain attitude and skill changes in some or all of a company's personnel.

The extent to which these changes are created will be determined by management's basic concepts of training. These concepts include the extent to which management believes in training and how much it is willing to spend to create desired changes in personnel.

After the proper concepts have been established, the next step is to decide which training projects are worth the cost—and whether the company is prepared to handle such training efficiently.

In determining the training program most worth the cost, three important factors must be considered: The trainee must be the center of the training process; the whole man must be trained, not just the special skills of the job; interest must be the power that makes the training machinery run.

These factors can be reduced to a formula—NI equals A. Where N is the number of responses, I is the average intensity of the responses, and A the amount of learning.

A trainee will learn what he wants to learn. The importance he gives to any skill or knowledge in his own scheme of values determines how fast he will learn it. Therefore, a training program should by all means include helping the employe to see that certain goals are of common interest to himself and his company. He should also be instructed in the most efficient ways to learn and to approach these goals.

The successful beginning—and completion—of a training program will be determined by the way in which training leaders answer four questions:

1. What are the most pressing training needs?
2. What are the means and methods best suited to satisfying training needs?
3. Are the training efforts going to be effective through the help of adequate evaluation and follow-up?
4. How can the program be improved?

Determine Most Urgent Needs. Before deciding what to teach, the training leader must find out the *existing* attitude, knowledge or degree of skill, then determine the *desired* attitude, knowledge or degree of skill. The difference between the two must then be analyzed so that the difference may be reduced by training. Following are ways the training leader can seek out the existing and desired situations:

- Testing.
- Performance records or studies.
- Formal surveys (questionnaires, polls, analyses).
- Informal surveys.
- Various combinations of the above.

It should always be kept in mind that a training project will be effective only when the trainee needs the training and knows he needs the training. Interest is one of the foundation stones of training.

Select the Best Means and Methods. The means and methods of executing a training project include courses or subjects, instructors, teaching methods and materials. Each of these factors is discussed below:

Courses or Subjects. Subject matter should be divided into:

1. Job Know-How.
   - Equipment and its use.
   - Job skill.
   - Technical and scientific training.
2. Human Relations.
   - Human relations for workers.
   - Supervisor training.
   - Executive development.
3. Policies and Procedures.
   - Policy and procedure manuals.
   - Interdepartmental forms and exchanges.
   - Induction and orientation.
   - Re-orientation.
4. Safety.
5. General.

And to these one should be added which is interrelated with all five of the above—Communication. Each of these six has some claim on the interests of all company personnel.

Job know-how is the most commonly taught subject. It is probably the most important. It commands the interest of the trainee because he feels that it contributes to many of his needs. The supervisor and the training specialist should exercise vigilance to see that material covered fills genuine needs. Otherwise it will be wasteful and frustrating.

Job know-how is most commonly taught on the job. But, whenever suf-

ficient information and sufficient employes can be combined, there are advantages to using a classroom. Training may possibly be done more thoroughly, and it can be accomplished without damage to or shut-down of equipment.

Human relations is not only a subject, it is a concept. It affects and is affected (for better or for worse) by all training. While supervisor and executive development include other training, such as job skills, procedures, and safety, human relations is the most important factor. Human relations should not be thought of as solely for management, however. Individual employes can learn to be better adjusted humans, better cooperators, and more effective co-workers. And human relations training frequently uncovers men with leadership potential.

Policies and procedures are often a part of supervisor training. Supervisors teach it as part of induction, orientation, and job skill training. The Procedure department holds occasional conferences when new manuals are distributed.

Induction orientation is the best form of policies and procedures training, because it comes to the person who most keenly feels his need, the new employe.

Safety is one of the oldest and best recognized types of formal training in the petroleum industry. It has been conducted as separate safety meetings, as a part of supervisor training, or as a part of job skill training.

We can determine training needs by accident records. Happier ways are testing, formal and informal surveys. Other indicators are new equipment, new employes, and transferees.

General training justifies itself on certain assumptions, such as:

- We must bring out the facts in order to protect our government and our economic system against hostile mis-information.
- Industry has excellent means for promulgating sound information.
- Any contribution to the cultural improvement of employes brings long range returns in better employer-employe relationships.
- Better educated employes make better customers, better workers, and better public relations representatives.
- Much valuable general training never gets to some employes through public schools and that industry should give it.

Over half of America's larger oil companies consider these assumptions valid for they offer at least some kind of general training.

When a company inaugurates a general training project, it should ask itself: What courses will the employe recognize as closely tied to his needs?

Communication training includes the various forms of writing, speaking and reading. All forms of training rely heavily on accurate facile communication. The conference probably leans more heavily on communication skills than any other. Communication is the conveyor belt of business.

Instructors. Instructors are divided roughly into three classes:

1. Line supervisor.
2. Outside agency or college.
3. Special company instructor, including:
   - Training supervisor or other training specialist.
   - A line employe designated by his supervisor at the job level.
   - A representative of a staff organization other than the Training Section.

The line supervisor is the backbone of training. He often does the bulk of it. At least he is responsible for the output and the welfare of his employes. It is often advisable to use staff representatives because of their knowledge of whatever technical subjects are being studied, i.e., procedures, safety, hydraulics, or costs.

Outside agencies are more limited as to amount of training, but can supply a helpful boost. Universities offer short courses in executive or supervisory development and in electronics, instruments, and other technical subjects. Some companies give monetary assistance to employes enrolled in evening classes, correspondence courses, half-day work-school, and full time day courses. The API has sponsored technical courses, and some manufacturers offer to their customers' employes short courses on how to use or operate the product.

The training specialist or training supervisor should be the best qualified training planner and conductor in your company. He should have a professional education in psychology, course building, and instruction methods. While the line supervisor is the backbone, the training specialist is the creative mind and spark. He must have a knowledge of training principles, be able to understand employes' wants, formulate training plans, and express himself fluently in speech and writing. With all of this, he must have the knack of getting others to put forth their best efforts. If your company does not have such a man, the alternative is to utilize a university professor or similar consultant to train and assist your instructors.

Who shall conduct a particular training project? Here an enlightened management rises to the support of good training practice. Rank, custom, and tradition step aside in favor of getting a job done. The decisive factors are:

- Benefits to the trainee.
- Benefits to the instructor.
- Long range benefits to the company from developing a number of good instructors.

The short range and the long range values should be carefully weighed in selecting the instructor or combination of instructors for each course.

When practicable, it is most often better to let the training specialist train the supervisors and the staff representatives, and let them carry the main burden of instruction. Obviously one man cannot do all the training.

Methods of Instruction. The same principles apply in the selection of training methods. Interest is the propelling force of training. You can develop interest by helping the employe relate his wants to the matter to be learned.

The use of a gun and a whip have been known to create learning interest, but this is an expensive, not to mention unethical, training method. Some better means include: Apprenticeship, lecture, demonstration, case study, problem solving, role playing, brain storming, and conference, directive, permissive, and sectionalized.

Materials. Some of the items to consider are:

- Classrooms suited to the training you want to conduct.
- Subscriptions to professional train-

ing magazines and memberships in training and management societies.

- Training library and files.
- Training aids.

Training aids include: Machines and parts. Work specimens. Sound recorder. Printed matter. Blackboards. Charts, pictures, diagrams. Picture projectors for transparent and opaque material. Mechanical trainers—animated panels, synthetic trainers.

Mechanical trainers are expensive. But properly used they may effect economies. They may prevent use and breakage of costly machines.

Sometimes a better job can be done with cleverly chosen training aids than would have been done with others costing many times as much money.

Keep in mind the following principles: Use as great a variety as practicable, the student will remember better. Use the combination best adapted to your particular problem. Make the learner the center—employ the equipment that he likes and can learn to use or understand.

Evaluate and Follow Up. Evaluation is a never ending struggle. It is accomplished by progress records, formal and informal survey, and testing. All these together should tell us whether our training is meeting employes' needs. All levels of management and the training staff should cooperate to see that, whenever practicable, the employe:

1. Uses his new knowledge and skills.
2. Advances as openings occur for which he has qualified himself.
3. Continues to learn and grow in his company career.

Keep Improving. Training needs change as conditions change. To keep abreast of the times requires continuing research and study. In the final analysis, success of your company's training activities will probably depend to a large extent on the calibre of your training supervisor and the cooperation given him by management and workers.

The irreplaceable ingredient of successful training is interest. Interest is the feeling of the trainee that the training is satisfying his wants.

Training is living—with encouragement. —**The End**

If Oil Could Speak

If oil could speak it would have many fascinating truths to tell the non-oil public—truths that would win thousands of new friends for the oil industry.

But, oil can't speak—you can. You, as an individual, can win many new friends for the oil industry if you will pass the true facts on to your non-oil industry friends.

Here are some of those true facts. They are being presented for one purpose: To keep you posted on your industry, so you can tell the story oil is unable to relate.

Read these facts. You will find them informative—and interesting.

"If Oil Could Speak" it would tell the American public:

Is Oil Research Comparable with Other Industries?

Expenditures on research for a new manufactured product seldom exceed five percent of gross income, whereas expenditures for petroleum exploration and dry holes require about 30 percent of the gross income of the industry, exclusive of development expenditures which represent an additional 35 percent of oil's gross income. This also is research. Furthermore, much research leads to improvements in existing processes and equipment which will pay for the cost of the work, whereas the search for oil must discover new deposits comparable with new inventions in order to result in any source of income.

Is Oil a Good Investment?

Out of the 27 industries that have stock listed on the New York Stock Exchange, petroleum ranks second in the line-up of securities which pay the highest dividends to investors.

Has Gasoline Efficiency Increased?

Gasoline efficiency has increased 77 percent since 1926, yet today's gasoline costs only about a penny more per gallon than it did 30 years ago (sans taxes).

Have Oil Prices Kept Pace With Cost?

No. While crude oil prices have increased only nominally in the past decade, exploration, development and production costs have more than doubled.

What Lies Ahead in Petroleum Demand?

Since 1946, the combined use of oil and gas in the U. S. has approximately doubled. Since population has increased less than 20 percent, this means a rise in per capita consumption of oil by more than 60 percent within 10 years. The use of oil will continue to increase rapidly and is expected to double within 15 to 20 years.

How Many Miles of Pipe Line are in the U. S.?

Today, networks of 190,000 miles of pipe lines for crude oil and oil products crisscross the nation. They move oil steadily from wells to refineries to consumers. They are one of the big reasons why the oil industry has been able to serve the American people economically and efficiently.

William P. Schubart, Dispatching Supervisor, runs a "tight line" by telephone from Plainfield, N. J. Private line circuits link him with 60 installations including refineries, pumping stations and terminals in Socony's Eastern Pipelines Division.

He's keeping track of 40 batches by private line telephone service

Using Bell System private line telephone service, [illegible] Plainfield, N.J., dispatcher of Socony Mobil Company keeps multi-product traffic flowing [illegible]ugh three different pipeline systems. Up to 40 [illegible]hes of different products are en route at the [illegible] time.

The dispatcher relies on the telephone (1) to ins[illegible]uct gaugers at delivery points, (2) to keep all products moving at a proper rate, and (3) to verify the volume of each batch at check points in the line.

Socony Mobil has used Bell System communications for 26 years, has found them dependable and accurate . . . qualities that may well help your own operation. Just call your Bell Telephone Company business office. A representative will gladly study your needs. No obligation, of course.

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CHANNELS FOR: REMOTE METERING AND CONTROL • TELEPHOTOGRAPH • CLOSED CIRCUIT TV

Facts About Pump Packings and Seals

Included in the final part of this complete report is a helpful guide to packing troubles and the ways to correct them. Proper installation is essential.

By Harold Woodhouse
Dean Hill Pump Company
Indianapolis

HANDBOOK

Part 1
Packing Boxes and Glands

Part 2
Packings

Part 3
Mechanical Seals

Part 4
Mechanical Seal Maintenance

Part 5
Packing Maintenance

SOME TIME ago newspapers carried a report about a big automobile race being lost because of the failure of a 50-cent magneto part. The car owner, with murderous intent, promptly chased the parts supplier who lived because he could run faster. Centrifugal pump packing seems an insignificant item in a large pump station but it causes many shutdowns.

Many pumps should be shipped without the packing installed. Very few companies ship pumps this way and some others who have done so in the past have given up the practice. The reason being that sometime between shipment and start-up at the site, the loose packing usually disappears. Another factor is that the pump is properly packed and then adjusted during factory test and this helps guard against improper packing and adjustment on the site and consequent failure during initial start-up.

Various manufacturers have reported that when a pump containing graphite packing is allowed to stand for a lengthy period the shaft or shaft sleeve in contact with the packing becomes etched, pitted or corroded. The greatest incidence of trouble seems to be when the shaft or shaft sleeve is carbon steel or iron. Some trouble is reported even when they are monel or stainless steel. Bronze seems to be the least affected.

This explains some pump failures during initial start-up. The condition cannot be corrected until the shaft or sleeve is reworked or replaced. When a lengthy shutdown of an installed pump is contemplated it may be advantageous to remove the packing.

A good rule, on the receipt of new pumps which are not to be put in service within 30 days or with installed pumps which are to be shut down for a greater period than this, is to remove packing and grease shaft or sleeve and stuffing box bore.

Repacking the Stuffing Box. To repack a stuffing box the first obvious step is to remove the old packing. Always remove and replace *all* of the old packing. Do not reuse some of the rings because they look all right. If, for instance, the three most accessible rings only are replaced, then they will be the only rings compressed when the gland is tightened. Consequently, the new rings will have to do all of the work of sealing the gland and an accelerated packing wear will result. The old rings, having been previously compressed, will move as a unit and fail to provide any sealing effect. In view of the various costs involved in shut-down time of

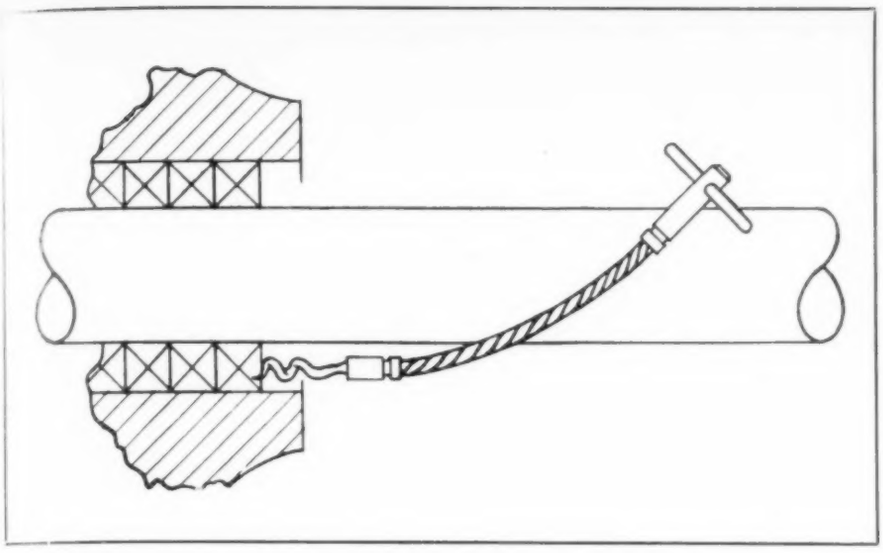


FIGURE 1—Corkscrew puller used for packing removal.

a pump, saving on packing is not economically justified.

Removing Packing. To remove packing, a puller, as illustrated in Figure 1, can be used. It consists of a short corkscrew section, on the end of a piece of flexible wire, attached to a handle. If the packing should break up during the effort to pull it out, as the cork in a bottle of wine sometimes does, all the broken pieces should be removed so as to have a clean and clear box before inserting the new packing. Any section of old packing ring that is not removed will make it impossible to pack the pump properly. This may sound elementary, but it is surprising how many pump troubles spring from elementary causes.

If the information is not separately and immediately available in writing, it is important that the person packing the pump note the number of packing rings in each gland and their arrangement. If there is a lantern ring in the box, it is usually arranged so there are the same number of rings on each side but the packing rings are not always all the same material or construction. For instance, where the pressure is high, the rings at the bottom of the stuffing box, next to the gland and either side of a lantern ring may be of a harder, less flexible construction (metallic or semi-metallic) than the remainder of the rings. This is to prevent their extrusion into the clearances between the bores of the throat bushing, lantern ring, gland and shaft. It is important to maintain this arrangement.

To determine the packing thickness do not measure old packing. Halve the difference between the stuffing box bore and the shaft diameter as shown in Figure 2.

Installing New Packing Rings. In cutting out the new packing rings, the correct way for coil packing is to wrap it around an arbor of the same size as the pump shaft as shown by Figure 3. This produces rings as in Figure 4 rather than Figure 5. The latter results when packing is cut out of a flat strip leaving a triangular open area which permits liquid leakage to bypass the packing. It also allows adjoining rings to squeeze partly into the open space so that the gap can never fully close. Generally, packing rings do not require an expansion gap as do engine piston rings.

However, channel type packing rings with a lead core may require a slight gap.

If the packing is slightly large, never attempt to flatten it with a hammer. Lay it on a clean flat surface and roll it with a piece of pipe like mother did with a rolling pin on a piece of dough.

To put a ring over the shaft do not pull it apart since it may break opposite the cut ends. Twist it over the shaft as shown in Figure 6.

Foil wrapped packing should be installed so that the foil edges at the bore face the direction of rotation, otherwise, the thin edges flake off and reduce packing life.

It is helpful, at assembly, if new metallic rings are swabbed with a lubricant. Note, however, that metallic packing should be used only with hardened sleeves since it would tend to cut softer materials.

The rings should be tamped separately in place. This is particularly necessary with plastic or metallic packing. Preferably, this may be done with a dummy gland which can be a split, plain sleeve of metal or wood which fits over the shaft.

The dummy gland's outside diameter should be slightly smaller than that of the stuffing box bore. A

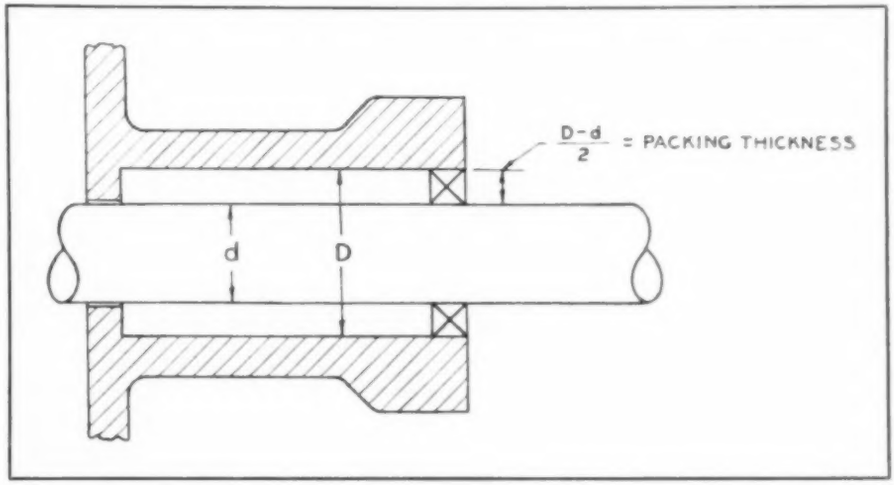


FIGURE 2—For replacement, do not measure the old packing thickness.

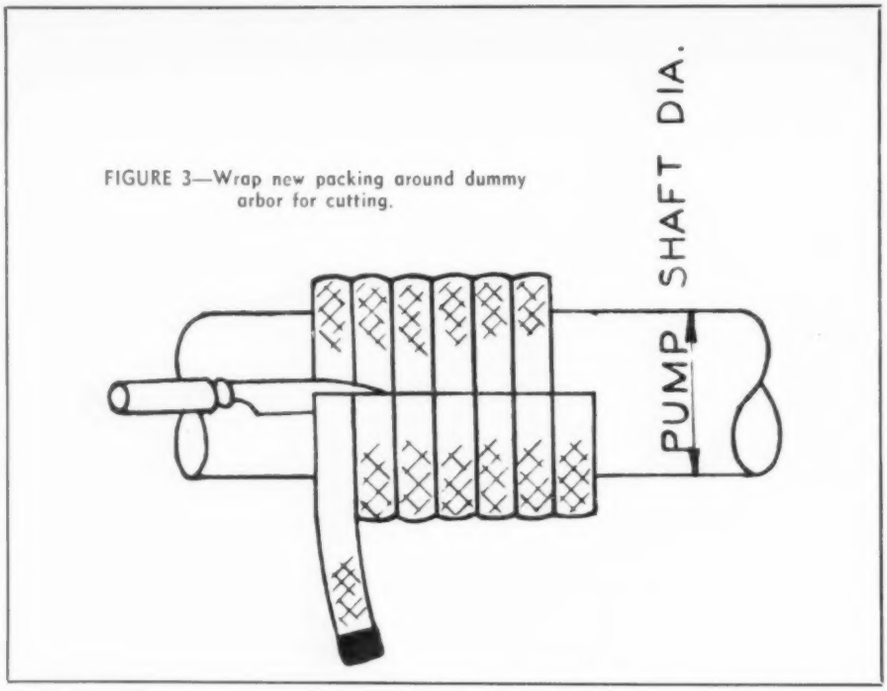


FIGURE 3—Wrap new packing around dummy arbor for cutting.

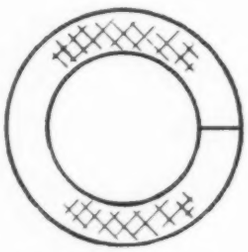


FIGURE 4—Cutting on an arbor produces perfect rings.

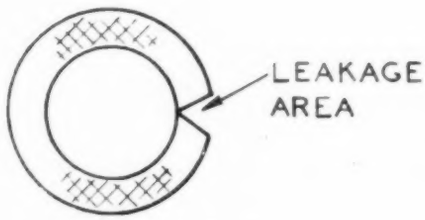


FIGURE 5—Cutting out of a strip produces triangular open area.

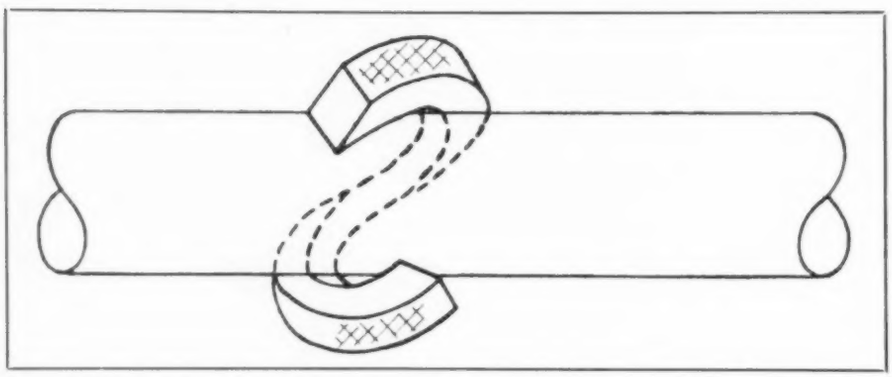


FIGURE 6—Twist packing ring over shaft to prevent breakage opposite the cut ends.

simpler substitute, but not as good, is a square-ended stick. The last few rings may be pushed into place using the gland.

The packing ring joints should be staggered as each ring is put in the stuffing box (180 degrees if only two rings are required per box, 120 degrees for three rings, 90 degrees for four or more).

If there is a lantern ring, it must be installed so that *when the packing is compressed* it lines up with the cooling liquid opening.

After each ring is tightly in place (woven and braided packing need not have each individual ring compressed), each ring should be dipped in oil and pushed to the bottom of the stuffing box. It is advantageous to rotate the shaft a few times by hand to "gloss" the packing. When the box is fully packed (the packing should never protrude past the stuffing box face so that the gland may be properly started in stuffing box bore) and the last ring has been firmly tightened, back off the gland nuts and retighten them *finger-tight* only. This allows the packing to expand as it warms up.

Packing Lubrication. If the pump is handling hydrocarbons, solvents or similar non-lubricating liquids, the pump gland should be fitted with a grease lubricator and a non-solvent grease used. Sealing of the stuffing box by using a sealing liquid or lubricator is required when a vacuum exists on the pump suction (refer to Part 1 of this series entitled 'Packing Boxes and Glands').

Apart from the mechanics of packing certain other points should be kept in mind:

The pipe supplying the gland sealing water should be fitted tightly so that no air is brought in. A small quantity of water entering the suction at this point may make it difficult to get the pump primed at starting and may result in the pump losing its suction during operation. This causes the pump to run dry, and complete failure may occur with considerable damage to the rotating elements and stationary case wearing rings.

If water or other liquid to be pumped contains acid, dirt or grit, sealing water or compatible fluid from some clean and clear outside source should be piped to the stuffing boxes to prevent damage to the packing and shaft or shaft sleeve (see Part 1 of this series).

Do not use untreated hemp or flax. They will score shaft or sleeve. Use only packing grade and combinations recommended by pump or packing manufacturer.

Before using aluminum packing, particularly on light hydrocarbons, check regulations regarding its use. One refinery fire was attributed to its use and while this opinion has not been generally accepted, there might be some opposition to its use in a specific application.

Many pump failures occur because inexperienced maintenance personnel note that liquid is dripping from a gland and they endeavor to stop it by tightening the gland bolts. For a very short period the leakage is stopped. The packing then becomes overheated and burns or scores the shaft or shaft sleeve. The pump must be shut down; the packing is ruined and, as likely as

not, an expensive new shaft or shaft sleeve is required, if they cannot be remachined.

A fundamental requirement with all packings is that they be lubricated at all times and this necessitates constant leakage.

When the gland is properly adjusted and the packing has been "run in," only a few drops of leakage a minute is necessary, but it is *essential.*

When a smothering gland is used, the amount of leakage cannot be seen during normal operation. If the liquid being pumped is cool, a deficiency of gland leakage may be noted by laying a hand on the outside of the stuffing box to determine if it is much warmer than the liquid (a slight temperature rise can be expected). If the pumped liquid is hot, it is necessary to shut off the liquid supply to the smothering gland for a brief interval and check the leakage.

If the stuffing boxes are fitted with external seals, check that any valves in their lines, to the pump, are open to ensure sealing liquid flow.

Care must be exercised in tightening the gland so that it remains square to the shaft. This is done by tightening the gland bolts alternately only a slight amount at a time. If this is not done, shafts and shaft sleeves may be scored by contact with the inner edge of the gland bore which will lead to rapid packing failure.

If friction of the packing prevents turning of the pump rotor by hand, it is not properly packed. It may be necessary, if the pump contains metallic packing and has been stored or shut down for a considerable length of time, to apply a bar to the coupling to force it to break away. Metallic packing has a tendency to stick after a period of nonuse.

When the pump is started, it is desirable to have the packing quite loose without causing an air leak. If there is too much liquid gland leakage, it is good practice to apply some heavy oil or other suitable lubricant on the packing until the pump is working properly rather than applying excessive pressure to the packing by tightening the gland bolts. Then gradually tighten the gland. It is quite important to watch a pump carefully for a few hours at initial start-up, or after re-packing. Since one may observe that, although the

TABLE 1

Packing Troubles, Their Cause and Cure

TROUBLE	CAUSE	CURE
No liquid delivered	Lack of prime	Packing too loose or defective, allowing air to leak into suction. Tighten or replace packing and prime pump.
Not enough liquid delivered	Air leaking into stuffing box	Check that there is some leakage through stuffing box while operating—if no leakage after reasonable gland adjustment new packing may be needed or Lantern ring may be clogged or displaced and may need centering in line with sealing liquid connection or Sealing liquid line may be clogged or Shaft or shaft sleeve below packing may be badly scored and allowing air to be sucked into pump.
	Defective packing	Replace packing and check smoothness of shaft or shaft sleeve.
Not enough pressure	Defective packing	As for preceding.
Pump works for a while and quits	Air leaks into stuffing box	See preceding.
Pump takes too much power	Packing too tight	Release gland pressure. Retighten reasonably. Keep leakage flowing—if none check packing, sleeve or shaft.
Pump leaks excessively at stuffing box	Defective packing	Replace worn packing. Replace packing damaged by lack of lubrication.
	Wrong type of packing	Replace packing not properly installed or run-in. Replace improper packing with correct grade for liquid being handled.
	Scored shaft or shaft sleeves	Put in lathe and machine true and smooth or replace.
Stuffing box overheating	Packing too tight	Release gland pressure.
	Packing not lubricated	Release gland pressure and replace all packing if any burnt or damaged.
	Wrong grade of packing	Check with pump or packing manufacturer for correct grade.
	Insufficient cooling water to jackets	Check if supply line valves opened or line clogged.
	Stuffing box improperly packed	Repack.
Packing wears too fast	Shaft or shaft sleeve worn or scored	Remachine or replace.
	Insufficient or no lubrication	Repack and make sure packing loose enough to allow some leakage.
	Improperly packed	Repack properly making sure all old packing removed and box clean.
	Wrong grade packing	Check with pump or packing manufacturer.
	Pulsating pressure on external seal liquid line	Makes packing move and prevents it taking a 'set'. Remove cause of pulsation.

gland was adjusted to allow a substantial leakage, after a period of time (which might be twenty minutes or several hours) the leakage has stopped or decreased to the point where it no longer provides sufficient lubrication and the packing starts to heat up. This is caused by swelled packing resulting from the absorption of water, or other pumped liquid, and an increase of temperature. The amount of swelling varies with the different packings manufactured. Although it is an undesirable characteristic it may be necessary to tolerate this condition for other desirable characteristics of the packing.

If the stuffing boxes should overheat, stop the pump and cool off the boxes before starting again. If necessary, repeat this procedure several times to "break-in" the packing and allow liquid to seep through for lubrication.

If there is liquid pressure at the back of the first ring in the bottom of the box, it is recommended that the gland bolts *not* be loosened while the box is hot as the complete set of packing may be pushed out as a unit and leakage may occur around the outside of the packing.

In common, cool water, double-suction pump applications, to ensure protection of the packing from burning, one can leave out the last ring of packing and avoid tightening the packing too much for initial start-up after repacking. Then, after the pump has run awhile the last ring may be added and tightened. This scheme may not work if there is too much suction lift on the pump as it may prevent the pump from acquiring and maintaining a prime. In such high lift conditions it may be necessary to tighten the packing gland at start-up to maintain a prime. But, this should not be done until a few starting attempts have shown that the pump will not retain its prime and then the gland tightening should be a minimum to avoid burning the packing or scoring the shaft or sleeve. Immediately after the pump is primed and running satisfactorily, the gland should be backed off to permit a leakage.

If the pumped liquid is in excess at 200° F. it is most likely that the pump will have been provided with water, or other liquid, cooled packing boxes and glands. Check that valves in these coolant lines are open and that liquid is being delivered to the pump. These coolant lines should be independent of, and not in series with, any coolant lines to the bearing housings. If, for any reason there is an extreme shortage of water, although it is by no means a *usual* arrangement, the two should be in series. Then, the coolant would go to the bearing housing first. The coolant flow should then be restricted so it is not too cold leaving the bearing housing, since this could cause the outer race of a ball bearing to shrink while the inner race was being expanded by a hot shaft. The result of this condition would be an early bearing failure.

If after a pump has been running satisfactorily it is noted that the driving power required is too high, it may be that the packing glands are too tight. The gland pressure should then be released and slowly retightened, watching both the gland leakage and the power input for the best compromise.

Packing Troubles. When packing wears too quickly, inspect the shaft or sleeve for signs of surface roughness, which may be caused by corrosion or the result of scoring by overheated packing. In instances where a pump speed has been increased, the greater head developed may have necessitated a change from soft, graphite-asbestos type to a metallic packing which requires the use of hardened sleeves as it scores soft metals.

An occasional source of packing trouble is caused by "run-out" of the shaft or sleeve. The run-out pushes the packing out of contact with the shaft and causes an excessive leakage. The operator then tries to reduce the leakage by excessive tightening of the gland bolts which can lead to a variety of troubles. If this is the suspected source of trouble, it is possible, in some instances, to mount an indicator on the pump casing to check the shaft or sleeve. In others, it is necessary to remove the entire rotor to check it while mounted on "vee-blocks" or between lathe centers.

Any particular trouble with a pump's performance may originate from a number of different directions. The causes of trouble indicated in Table 1 are only those which might *possibly* come from packing, seals or shaft or shaft sleeves. The actual cause of trouble in a specific instance may be caused by other conditions.

A great many brand names of greases for packing are available and for ordinary cool water service probably all are acceptable. For special applications the problem should be referred to the pump or grease manufacturer.

Table 2 is a list of packings which may be used as a guide to the basic materials to be used with various pumped media.

TABLE 2

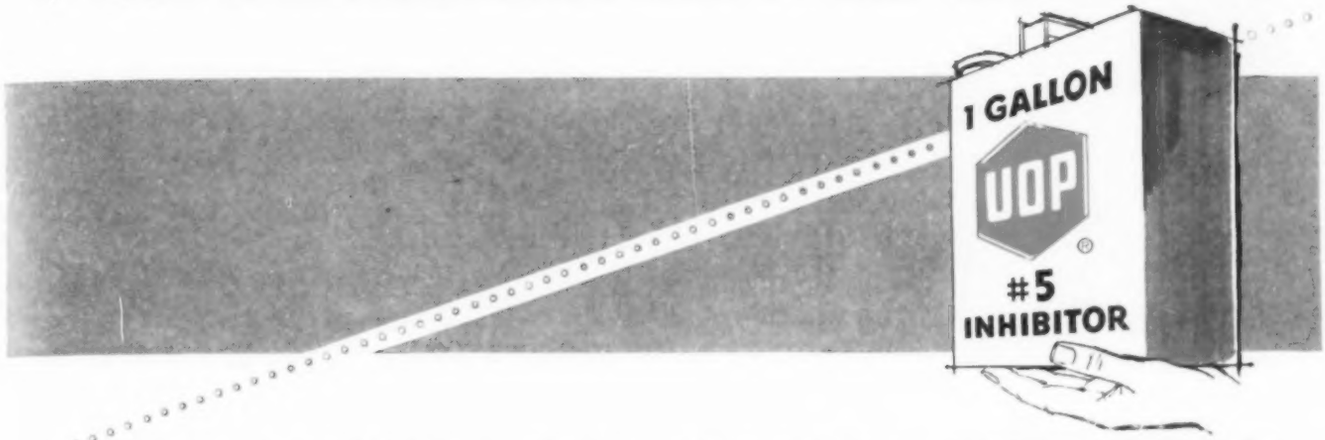
Guide to Packings for Various Media

Medium	Centrifugal and rotary shafts
Steam, High Pressure	Asbestos. Metallic. Semi-metallic Plastic (loose fill)
Steam, Low Pressure	Asbestos. Metallic. Semi-metallic Plastic (loose fill)
Water, Hot	Asbestos. Semi-metallic. Plastic (loose fill). Mechanical seals.
Water, Cold	Asbestos. Flax, jute or ramie. Cotton or rayon. Semi-metallic. Plastic (loose fill). Mechanical seals.
Gasoline and Oils, Hot	Asbestos. Semi-metallic. Plastic (loose fill). Mechanical seals.
Gasoline and Oils, Cold	Asbestos. Semi-metallic. Plastic (loose fill). Mechanical seals.
Air	Asbestos. Semi-metallic. Plastic (loose fill). Mechanical seals.
Gas	Asbestos. Semi-metallic. Mechanical seals.

ACKNOWLEDGMENT

The information contained in the tables is published through the courtesy of The Garlock Packing Company, Palmyra, N. Y.

* IT TAKES SO LITTLE OF THIS



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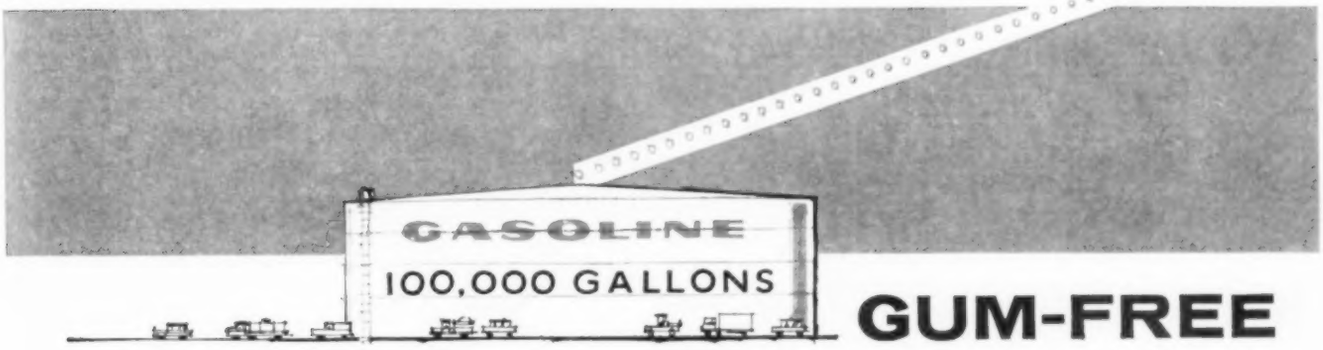

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UOP #5 is one of a number of UOP inhibitors and additives available to the refining industry. If you have a protection or preservation problem for product or transport facilities consult us.

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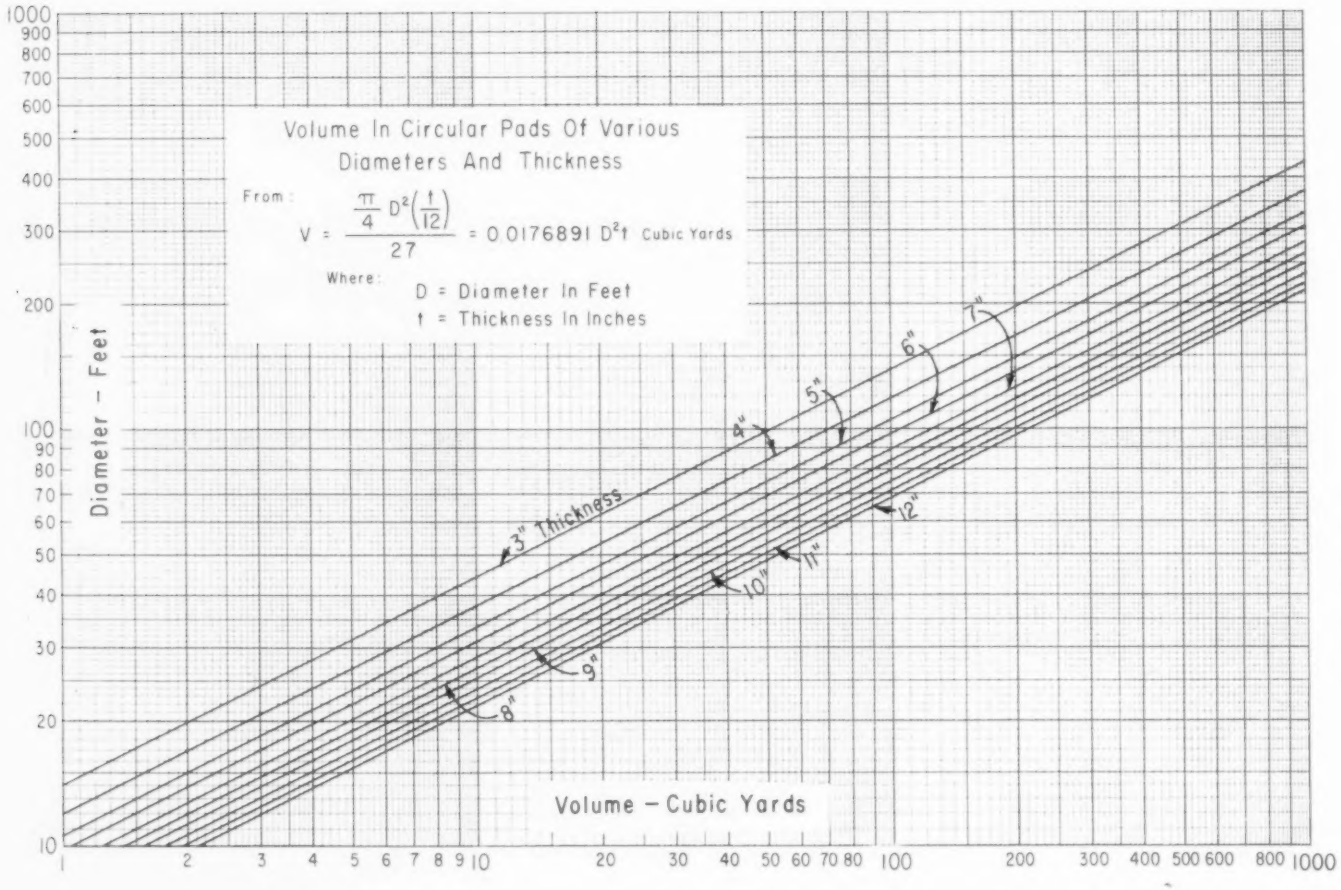


Engineering Design

—35—Chart for determining volume in Circular Pads of Various Diameters and Thicknesses

The use of this graph will simplify calculation of the amount of fill required in designing tank pads. Recent installations have shown the use of asphalt pads to be superior and no more expensive than dirt fills. Quick calculations of the requirements for a tank pad can be made by using this chart.

Example:

Given: Diameter of pad—100 ft.
Thickness—6 ins.

To determine the volume in cubic yards, note the point the line corresponding to 100 feet intersects the diagonal line for seven inches. Reading down will give a volume of 125 cubic yards.

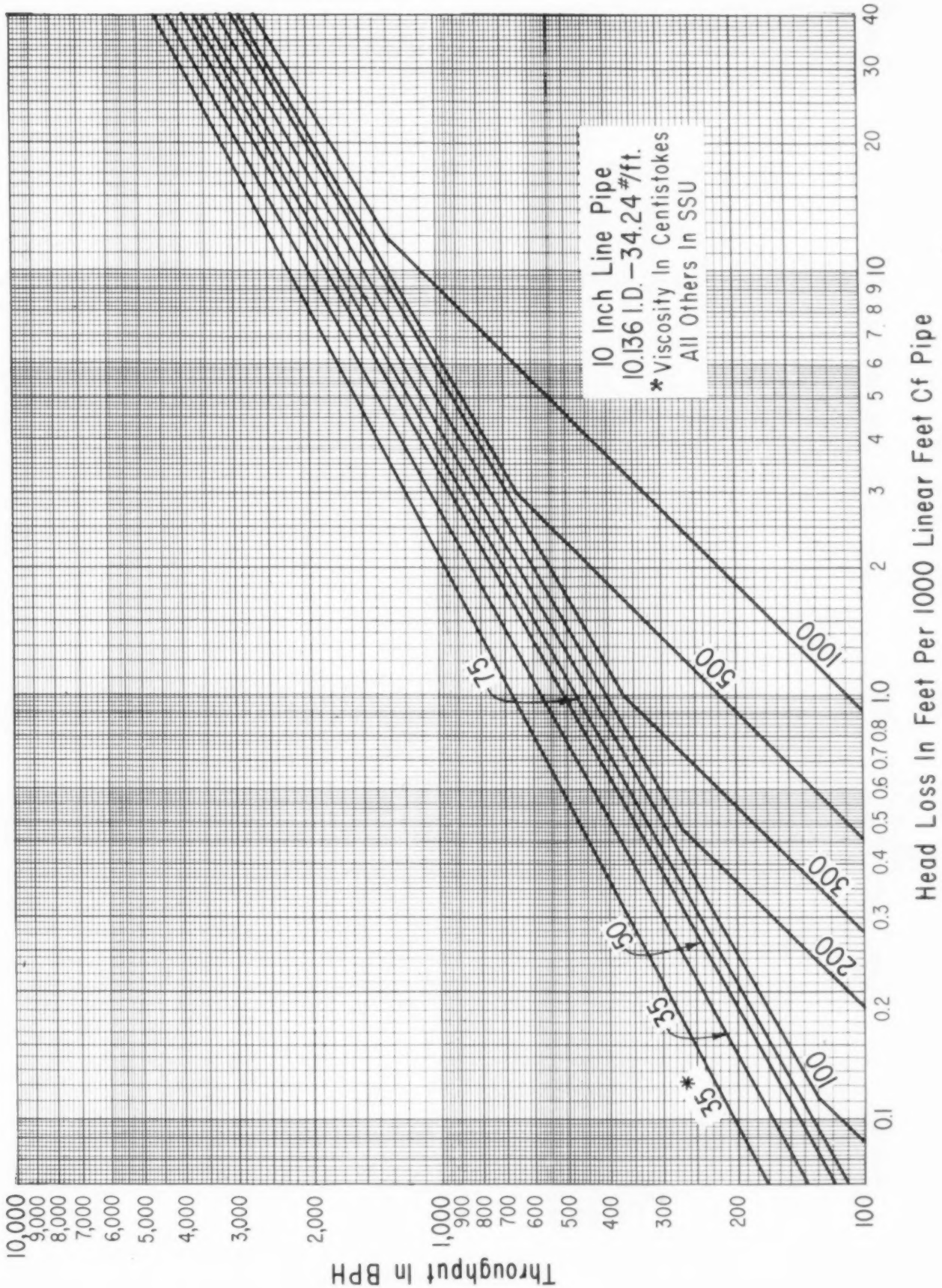
Engineering Design

—36—Head Loss Charts for Various Sizes of pipe

Friction Loss Characteristics for 10-inch pipe were computed by a pipe line company using data of the Hydraulic Institute. Use of this data in laminar and critical zones is adequate for estimates. Friction losses in transition and complete turbulence zones are very accurate.

(Chart 4 in a series of 19—10-inch line pipe)

ENGINEERING DESIGN 36



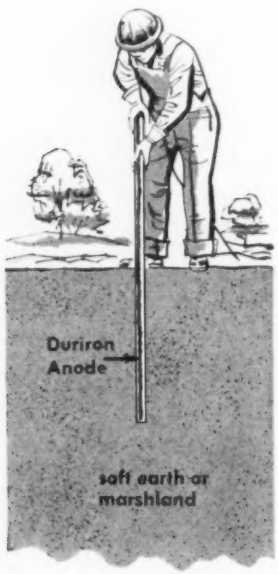
32 DURIRON® ANODES protect 11,000 feet of steel water line without backfill

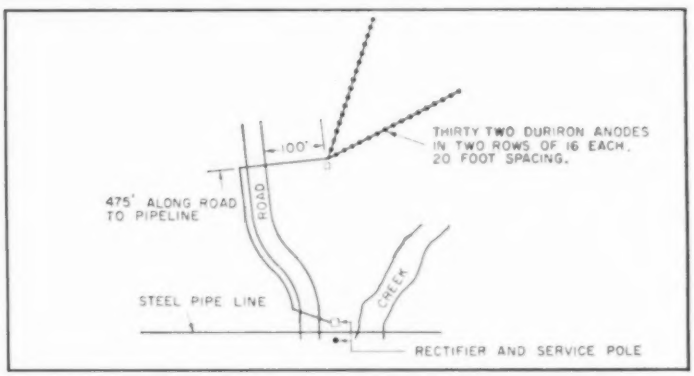
The Problem:

An isolated section of 11,000 feet of steel water line needed cathodic protection. Tests showed current requirements to be 40 amps., but replacement of adjacent wood stave lines called for extra capacity. Ground was a peat bog with water table standing at 6 inches below surface, making backfill methods impossible.

The Installation:

32 Duriron Anodes (2" x 60") were installed without backfill, by digging through the dry surface and then pushing anodes down until the tops were 3 feet below surface. Anodes were installed 20 feet apart, in two rows, with a calculated resistance of one ohm, based on previous experience with similar installations. While conventional backfill columns would have reduced the number of anodes necessary, the use of bare anodes constituted a major saving in cost.




100'
THIRTY TWO DURIRON ANODES IN TWO ROWS OF 16 EACH, 20 FOOT SPACING.
475' ALONG ROAD TO PIPELINE
ROAD
STEEL PIPE LINE
CREEK
RECTIFIER AND SERVICE POLE

The Performance:

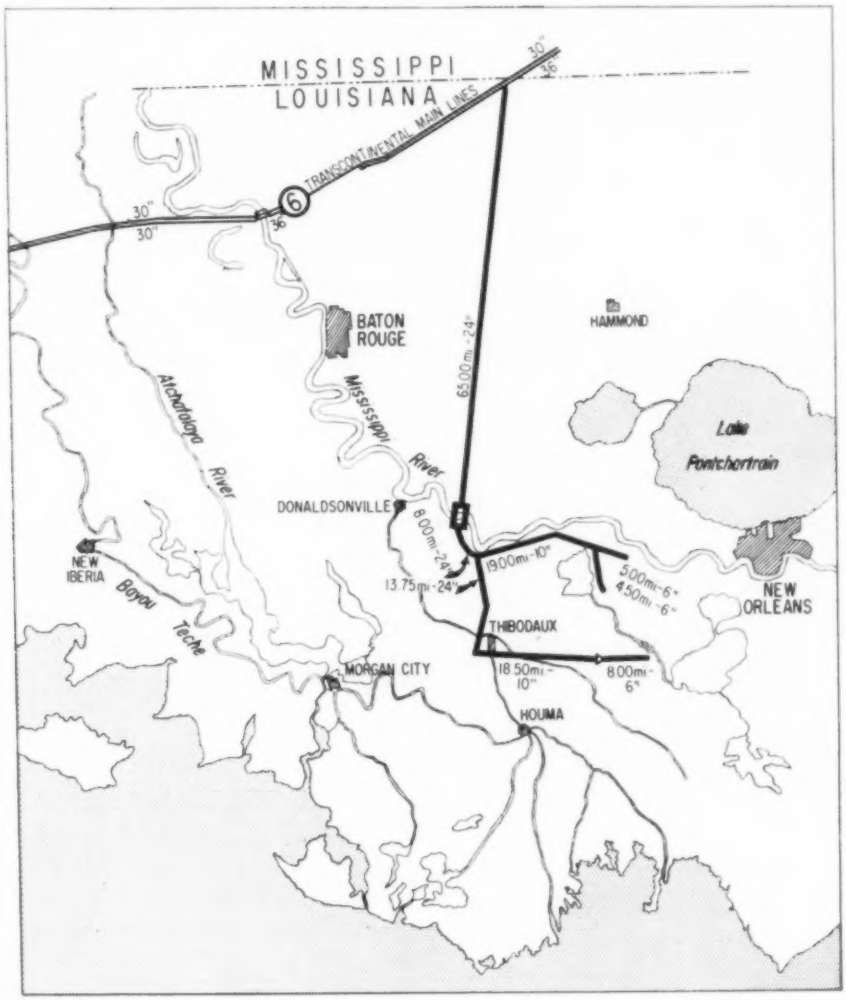
The anode bed is discharging 60 amps. at a terminal voltage of 59 volts. The entire line section is under protection, the minimum potential being 1.18 volts. This affords ample margin to handle prospective additions to the line. Agreement between actual and calculated anode resistance is quite close.

Action:

For further information on this particular installation or for technical assistance on other Duriron impressed current anode installations, write:

DURCO
CORROSION RESISTING ALLOYS & EQUIPMENT

THE DURIRON COMPANY, INC. / DAYTON, OHIO



Transcontinental Files FPC Application For Southeast Louisiana Gathering Lines

Transcontinental Gas Pipe Line Corporation of Houston has recently filed an application with the Federal Power Commission to construct a new gathering system into southeast Louisiana.

To cost more than $14 million, the system would consist of 87 miles of 24-inch, and 56 miles of 6-inch and 10-inch lateral lines. The 24-inch lateral will connect with Transcontinental's main line on the Louisiana-Mississippi border. The new contracts provide for a minimum purchase of 68 Mmcf of gas daily during the first year. However, capacity of the supply system to be built will be 222 Mmcf daily. Substantial undeveloped reserves exist in the area and anticipated additional volumes of natural gas dictate the extra line capacity.

Sixty-five miles of 24-inch lateral will extend almost due south to the Mississippi River from a point of connection with Transcontinental's main line in St. Helena Parish on the Louisiana-Mississippi state border. The 24-inch diameter line will span St. Helena, Livingston, Ascension and St. James parishes. A multiple crossing will be built under the Mississippi River near the town of Convent.

South of the Mississippi River, 22 miles of additional 22-inch lateral is planned. Smaller laterals, 10 and 6 inches in diameter, will extend into the seven fields. Construction is planned to start in early 1958.

Gas fields containing reserves under contract to Transcontinental in the parishes of Lafourche and St. Charles are North Thibodaux, Thibodaux, Raceland, Bayou des Allemands, Lucy, Lac des Allemands and Hahnville. A total of nine purchase meter stations will be built by Transcontinental in these fields.

Transco also recently received temporary authority to construct 43.6 miles of 30 and 36-inch loop pipe line at an estimated cost of approximately $6.3 million. The proposed looping will be in Louisiana, Mississippi, Alabama, Georgia, South Carolina, North Carolina and Virginia.

Transcontinental said the additional looping would raise its total pipe line capacity from 877 Mmcf to a projected 921 Mmcf. Facilities are part of a proposal by the firm to render increased service to 16 existing customers and to initiate service to four new customers. Estimated cost of the entire project would be more than $61 million.

Arabian American Plans Increase for Crude Line

Five months after the new 22-inch crude line from Safaniya field in Saudi Arabia to Ras Tanura has been placed in operation, Arabian American Oil Company announces plans to increase its capacity and loop it with a new 30-inch line.

A new pump station will be constructed near the mid-point of the 137-mile line. It will utilize three 900-hp centrifugal pump units. Some of the 30-inch pipe for the new parallel line is already in Saudi Arabia, and the remainder is being purchased in the U. S. and Europe.

Installation of the new pumping station in the "old" line is expected to boost capacity from 125,000 barrels daily to 190,000. After construction of the new 30-inch line, the Safaniya-Ras Tanura pipe line system will exceed 400,000 b/d capacity. Crude oil to be produced at the new Khursaniyah field is likely to be pumped through the same system.

Shell to Sell Half of Gas Required For Alberta to California Pipe Line

Sponsors of a planned $330 million natural gas pipe line from Alberta to California and officials of Shell Oil Co. recently announced that negotiations have been completed for purchase from Shell of about half of the natural gas required for the 1300-mile pipe line.

This arrangement will result in payment to Shell during the first ten years of gas delivery of more than $100 million.

Construction on the Alberta-California pipe line will commence as soon as formal clearances have been obtained from the Alberta Oil and Gas Conservation Board, the Canadian Board of Transport Commissioners at Attawa, the Federal Power Commission in the U. S. and California Public Utilities Commission. Present plans schedule the project to go into operation late in 1960 with initial deliveries of 400 Mmcf daily.

In the joint announcement Jack K. Horton, president of the newly formed Alberta and Southern Gas Company, Ltd., said the gas will be purchased for Pacific Gas and Electric Company of San Francisco, for distribution in the California market.

Shell officials estimate that the company will be able to supply 200 Mmcf of natural gas per day to the multi-million dollar transmission system. Four major natural gas fields in which Shell Oil Company and Canadian Shell Explorations, Ltd., have holdings, are involved. These fields are located in the Waterton area at Sarcee, 15 miles southwest of Calgary; Crossfield, 20 miles north of Calgary, and the Homeglen-Rimbey field, 60 miles south of Edmonton.

Shell will sell to Alberta and Southern all of its gas supplies in these four fields. In addition, Shell has agreed to sell to Alberta and Southern any gas which is discovered by it in the next ten years in southwestern Alberta up to a total of 5 trillion cubic feet.

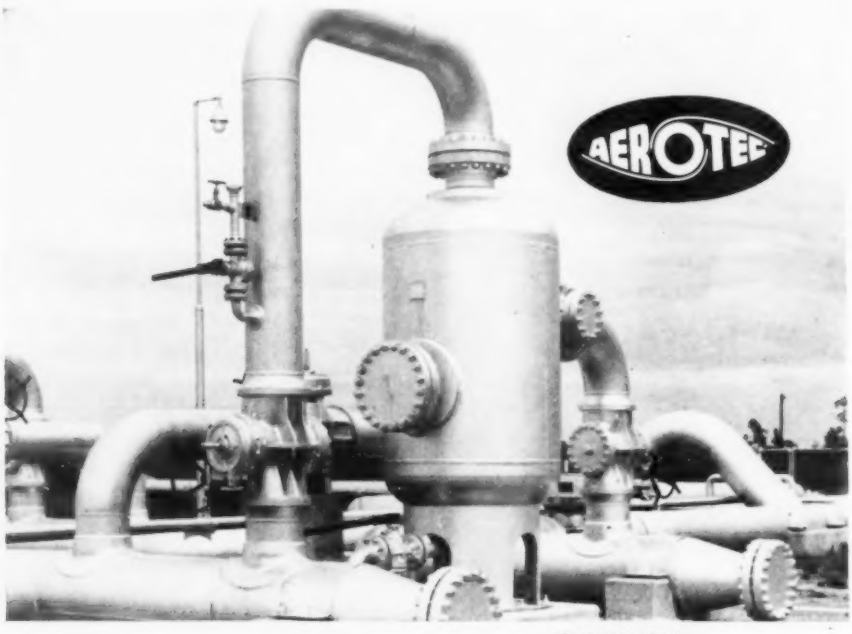
Texas Eastern and Others Ask for FPC Authorization

Hearings before Federal Power Commission began in September on three related applications involving the construction of new pipe line facilities by Texas Eastern Transmission Corporation and Texas Eastern Penn-Jersey Transmission Corporation, both of Shreveport, La., and the sale of additional gas by Algonquin Gas Transmission Company of Boston.

Texas Eastern proposes to build facilities estimated to cost more than $25.9 million to expand natural gas transmission capacity by additional 112,203,000 Mmcf per day of long-term firm gas. In addition the company proposes to deliver approximately 92,644,000 Mmcf per day of winter peaking gas for this winter.

Penn-Jersey will construct facilities, estimated to cost more than $4.4 million to increase the transportation capacity of its pipe line system. These facilities would be leased to and operated by Texas Eastern.

Algonquin seeks authorization to sell 6,259,000 Mmcf daily of winter peaking gas to some of its customers. Gas would be purchased from Texas Eastern near Lambertville, N. J.



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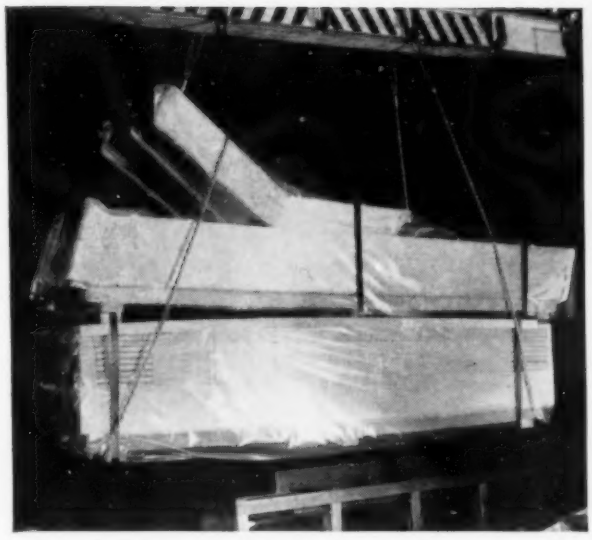

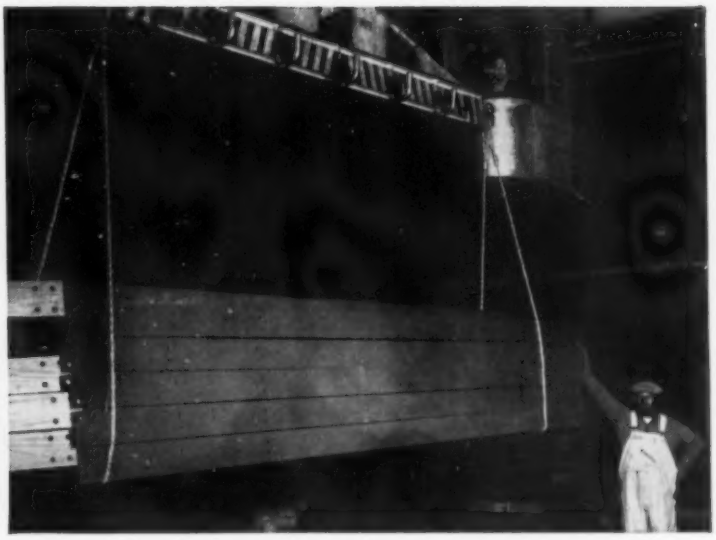

BUILDINGS AWEIGH! One of the nation's largest makers of prefabricated steel buildings speeds up production with Tuffy Slings. High flexibility makes Tuffy Slings conform perfectly to irregularly shaped load contours and sharp corners, and snug down smoothly in a choker hitch. Handling and rigging time is cut to the bone. Photographs show heavy loads of steel sheathing panels and steel structural members of prefabricated buildings being handled by Tuffy Slings.

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With the help of a vise, you might succeed. But you'll find the kink smooths out with hardly a trace of damage. Tuffy's machine-braided fabric won't take a "set" or deformity under the toughest of ordinary working conditions.

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FAST PACE SET BY INTERNATIONAL

Speeds completion of new

One of two Flagg International TD-14 dozers working here is shown backfilling behind the lowering-in operation to speed clean-up operations.

SUPERIOR SIDEBOOMS

gas distribution system

Working on a 16-mi. stretch from Medina to Lockport, N.Y., this TD-14A boom tractor puts 3,000-ft. of 10-in. pipe in the trench each shift for the Flagg Co. The new TD-14 sideboom on this job lifts 32,950-lb. at 4-ft. overhang.

The New York Electric & Gas Corp. is rushing natural gas to users in and around Lockport with a new distribution pipeline network that will be completed before Christmas. This year more than 60 miles of new mains and service lines, from 16- to 1-inch, are being placed.

C. N. Flagg & Co., Inc., Albany, N.Y., has the prime contract for the improvement. This firm specializes in all types of pipelining throughout New York as well as three New England states. And on all of its scattered operations, the Flagg firm relies on International Superior sideboom tractors to meet or beat completion dates.

Jack Chaney, Flagg's area manager at Lockport, tells why: "I'm getting up to 3,000 ft. of pipelaying production daily from the three International Superior TD-14 and TD-9 sidebooms on this job. All are doing more than an adequate job. In my 15 years around Internationals I've noticed how design changes constantly improve the efficiency, safety, and ease of operation of these machines. And they stay on the job, too!"

Whether you lay service lines or big-inch pipe, you can get convincing performance proof of International Superior sideboom advantages by calling your International Construction Equipment Distributor. He's prepared to lay it on the line and demonstrate, whenever you say. Ask to see an International Superior TD-24, TD-18, TD-14, or a TD-9 in action. Then you'll see how any bonus-powered International Superior sideboom gives you a decisive margin of pipelaying power for your equipment dollar.

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Gulf Interstate's Hearings Begin On $24.5 Million Gas Application

Hearings before Federal Power Commission began September 23 on Gulf Interstate Gas Company's application to construct additional natural gas facilities at a cost of more than $25 million.

The proposal included the addition of 69,000 hp in ten main line compressor stations located in Kentucky, Tennessee, Mississippi and Louisiana; a 300 hp compressor station at East Mud Lake field, Cameron Parish, La., and approximately ten miles of loop supply pipe line from Erath field. Estimated cost of these facilities is $24.5 million. The FPC granted Gulf Interstate temporary authorization for construction in April, 1957.

The company also proposes to construct about 8.7 miles of various diameter field lines in Acadia and Vermilion parishes, La., at an estimated cost of approximately $272,000.

The proposed construction, Gulf Interstate's applications state, is for the purpose of increasing the design capacity of its existing facilities by 127 Mmcf of natural gas per day.

In earlier action the Federal Power Commission granted Gulf Interstate a permanent certificate for construction and operation of natural gas pipe line facilities in Louisiana, Mississippi, Tennessee and Kentucky. Additions, estimated to cost over $8 million, are designed to permit Gulf Interstate to increase its natural gas deliveries from fields in southern Louisiana to United Fuel Gas Company at Means and Leach, Ky.

The certificate covers additional compressor facilities, totaling 19,500 hp, in Louisiana, Mississippi, Tennessee and Kentucky, and miscellaneous small gathering lines and measuring stations to connect new supplies of gas contracted for by United Fuel in southern Louisiana.

The approved facilities are designed to increase the designed capacity of Gulf Interstate's system from 401 Mmcf per day to 448 Mmcf daily. Under overload conditions, Gulf Interstate could deliver 473 Mmcf per day to United Fuel, the FPC discloses.

Mocane-Laverne Pipe Line Construction Completed

Construction of the final link in the gathering system to tie in with natural gas reserves totaling more than 850 billion cubic feet in the Mocane and Laverne areas of western Oklahoma to Colorado Interstate Gas Company's main line is completed.

Gas supplies from the Laverne and Mocane areas flow 50 miles to Hooker, Okla., via a 22-inch transmission pipe line. With the completion of Colorado Interstate's Beatrice project, the gas will move westward from Hooker to Interstate's Morton County, Kansas, compressor station and then into one of the company's main transmission lines for use in the Rocky Mountain and Midwest markets.

Construction of Interstate's gathering facilities in the Laverne area was concluded early in September. The Mocane facilities were put into operation in early June. Next step in the further development of these areas will come with the construction of a main line plant at Mocane for the extraction of natural gasoline and other liquefiable hydrocarbons.

Natural Gas Pipe Line Map Of U. S. Released by FPC

The Federal Power Commission recently issued the June 30, 1957, revision of its map of major natural gas pipe lines in the U. S. This latest map supersedes the Dec. 31, 1956, edition.

Approximately 13 by 18 inches in size with a scale of 170 miles per inch, the map is printed in five colors. It shows major existing pipe lines, those under construction, those which have been authorized and not yet started, and proposed lines which are pending FPC action. Pipe line systems of 126 companies are represented. In addition to pipe lines, the map shows the location of natural gas fields, indicating both major sources and generalized areas of supply.

Copies of the map may be purchased from the Federal Power Commission, Washington 25, D. C. at 25 cents each. The order number is FPC-M-50.

Fall API School Starts At Baytown October 15

The Committee on Personnel Training of the API Division of Transportation has announced its third session of the School of Pipe Line Technology.

School will open October 14, and lessons will last for six weeks at Lee College, Baytown, Texas. Sponsored by the API Division of Transportation, the school is operated by the Petroleum Extension Service of The University of Texas in conjunction with Lee College and Texas Education Agency.

Instruction is directed toward supervisors and prospective supervisors with special emphasis on crude and products pipe lines. The curriculum was developed by the API Committee with instructors furnished by the transportation industry and by educational institutions. Attendance is limited to 35 per session. Company scholarships cost $300, not including living expenses.

Class instruction is held six hours a day with a one half-day field trip each week. The topics are broken into units. Although the practice is not recommended, it is possible for company scholarships to be divided among several men according to units of instruction.

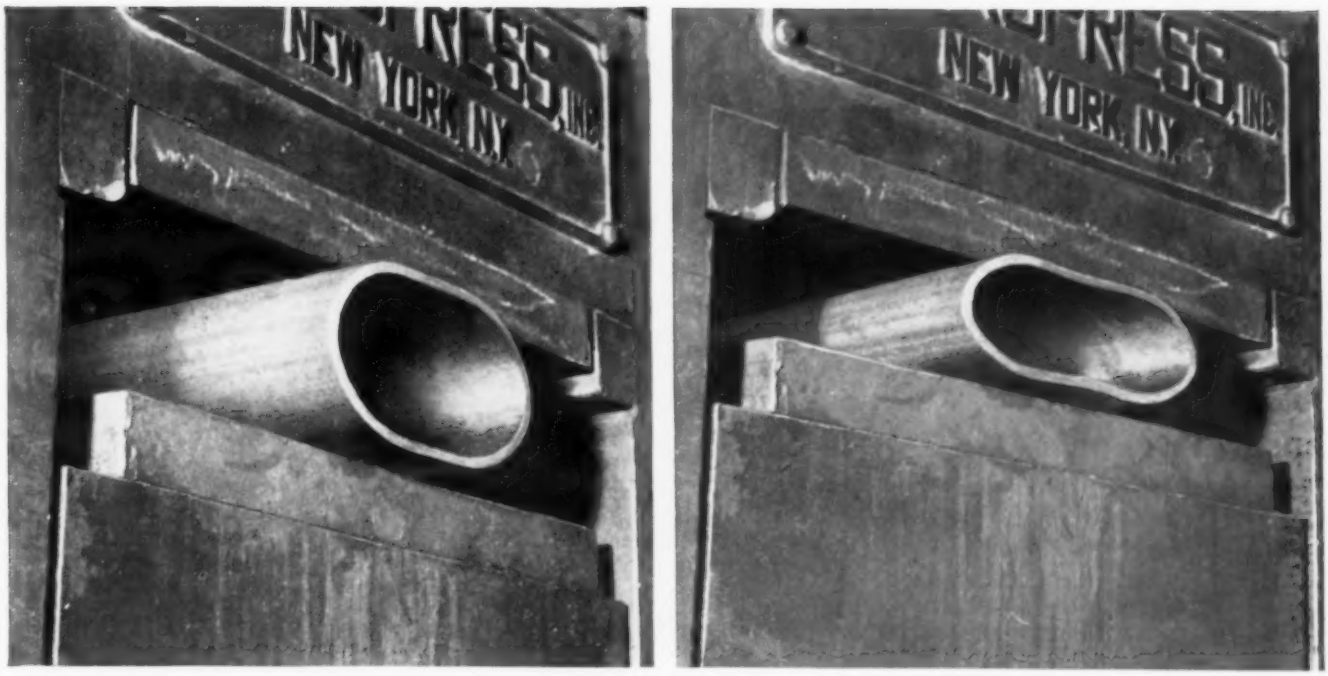
Topics for the first week, unit number one, will include Economics and History of Pipe Line Transportation, Personnel Organizations to Executive and Departmental Functions, and Industrial and Public Relations.

Main Line Design and Construction will be the subject for Unit Number Two to be presented the second week.

The third and fourth weeks during which Unit Number Three will be studied will feature Main Line Maintenance, Corrosion Control, Gathering System Design and Construction, Gathering System Operation and Maintenance, and Main Line Tank Farms.

The final session, Unit Number Four, during the fifth and sixth weeks of the course, the school's subjects will center around Terminals, Main Line Stations Operation and Maintenance, Main Line Stations Design and Construction, Scheduling and Dispatching, and Communications.

DUCTILITY



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West German Oil Refining Firm Lays Seamless Pipe Line from Rhine River

Gelsenberg Benzin AG, West German oil refining firm, is laying a 27-mile pipe line from the Rhine River port of Wesel to its refineries in Gelsenkirchen-Horst.

The pipe line will have annual crude oil capacity of 6 million tons. Pipe is seamless steel and 9 inches in diameter.

Gelsenberg AG, whose refinery output is now outstripping its supplies of crude, optioned for construction of the Wesel-Gelsenberg pipe line over participating with German Shell and other companies in the Ruhr-North Sea pipe line, between Leverkusen, on the Rhine, and Wilhelmshaven.

Along with laying the pipe line, Gelsenberg AG is constructing petroleum cargo handling facilities at Wesel, including five docks, a pumping station, a boiler house and two storage tanks, each with space of 5000 cubic meters.

Total cost of the pipe line and Wesel port facilities will be approximately $5 million.

PROPOSED PIPE LINE CONSTRUCTION

Here in convenient summary form is Pipe Line Industry's listing of company, line size, length, service, location and project status.

U. S.

Cape Pipe Line Co., Philadelphia, 100 miles, large diameter, Delaware Bay to the Philadelphia refining area, planned.

Chicago District Pipeline Company, 52 miles, 30-36 inch, gas, from Natural Gas' proposed line at Joliet to Chicago, $13 million, before FPC.

Cities Service Gas Co., Oklahoma City, 116 miles, gas, facilities in Kansas and Oklahoma and pipe lines in Kansas, $11.4 million, authorized.

Coastal States Gas Producing Co., Corpus Christi, Texas, 45-mile, gas gathering system in Bee County, Texas to connect with Texas Eastern's main pipe line, $1 million, planned.

Coastal Transmission Corp., Houston, 574 miles, 22-26 inch, gas, from McAllen, Texas to Baton Rouge, La. connection of Houston, Texas Gas and Oil plus 414 miles of laterals, $55 million, authorized.

Colorado Interstate Gas Co., Colorado Springs, 734 miles, 24-30 inch, gas, from Texas & Okla. Panhandle to Kit Carson, Colo., to Beatrice, Neb., plus four compressor stations, $120 million, before FPC.

50 miles, 22 inch, gas, from Mocane area to existing system at Hooker, Okla., authorized.

Deep Rock Gas Co., Oklahoma City, 120 miles, 6-inch, LPG, from Tioga, N. C., to Canadian border, planned.

El Paso Natural Gas Co., El Paso 1141 miles, 6-34 inch, field and main lines, gas, facilities in Texas, New Mexico and Arizona to deliver gas to Southern Calif. Gas Co., Southern Counties Gas Co., and Pacific Gas & Electric Co., $162 million, 290 miles authorized.

500 miles, 34 inch, gas from Twin Falls, Idaho to California border near Las Vegas, Nev., planned.

Emerald Pipe Line Corp., 120 miles, 6 inch, products, from Sunray, Texas, to Tucumcari, N. M., planned.

Four Corners Pipe Line Co., Houston, 600 miles, 16 inch, crude, from Four Corners area to Los Angeles plus 150 miles of feeder lines, $50 million, contracts let on 635 miles to A. P. Vaughn Construction Co., R. H. Fulton Construction Co., Potashnick Construction Co., Pacific Pipeline Co. and Standard Pipeline Construction Co.

Great Lakes Pipe Line Co., Kansas City, Mo., 93 miles, products, from Minneapolis and St. Paul to petroleum terminal in northwestern Wisconsin, planned.

Great Northern Railway, St. Paul, 400-600 miles, 12-20 inch, crude, from Williston Basin to St. Paul-Minneapolis and Duluth-Superior areas, considered.

Gulf Interstate Gas Co., Houston, additional compressor facilities in Kentucky, Tennessee, Mississippi, and Louisiana, 8.9 million, authorized.

Compressor additions, $24.7 million, before FPC.

Harry Bass & Sons, Inc., Dallas, pipe line network from well heads to compressor stations to central gasoline plant plus line to railroad in Pembina field, Alberta, $17 million, approved.

Home Gas Co., Pittsburgh, Penn., gas facilities in New York, $3.8 million, authorized.

Humble Oil & Refining Co., 200 miles, main gathering system line of varying sizes, 250 miles, 26 or 30 inch main carrier, gas, from southwest Texas to Houston, plus gas processing and cycling plant near Corpus Christi, $75 million, planned.

Iron Ranges Natural Gas Co., 115 miles, gas, from Itasca and St. Louis counties along route of Mesabi range from Grand Rapids to Aurora, Minn., $5 million, before FPC.

Laurel Pipe Line Co., Philadelphia, 440 miles, 14-24 inch, products, from Philadelphia to Pittsburgh to Cleveland, $50 million, planned.

Magna Pipeline Co., 40 miles, gas, underwater line from Anacortes, Wash., to Victoria, B. C., $6 million, planned.

Michigan Gas Storage Co., Jackson, Mich., facilities in central Michigan, $2 million, authorized.

Michigan-Wisconsin Pipe Line Co., Detroit, 472 miles, 4, 24-inch, gas, main line loops and extensions in Wisconsin, Illinois, $17.6 million, before FPC, temporary authorization for a part, 47.5 miles let to G. E. T. Construction, Inc.

Midwestern Gas Transmission Co., Houston, 2067 miles, 3-24 inch, gas, from Emerson, Manitoba, to Nashville, Tenn., $103 million, before FPC.

Natural Gas Pipe Line Co. of America, Chicago, 25 miles, gas, from Quinduno field in Roberts County, Texas, $3.2 million, authorized.

416 miles, 30 inch, gas, loops at various points along existing line, $76.2 million, before FPC.

396 miles, 30 inch, gas, loop line between company's terminus in Texas and Beatrice, Neb. and Joliet, Ill., $62.7 million, before FPC.

North Carolina Natural Gas Corp., 630 miles, 2-16 inch, from Transco's system near Mooresville across to southeastern North Carolina, authorized.

Northern Natural Gas Co., Omaha, 167 miles, 20 inch, gas, from Farmington, Minn. to Duluth, Minn., and Superior, Wis., $12 million, before FPC.

42 miles, 10 inch, gas, from Rochester, Minn. to Winona and Goodview, Minn., $963,000, before FPC.

365 miles, gas, new facilities in Minn., Iowa, S. D., Neb., Wis., plus 1090 miles of branch line and station facilities, $65.7 million, authorization for a part.

Northwest Pipeline Corp., Salt Lake City, 350 miles, 6-10 inch, crude and products, Four Corners area to Salt Lake City, $15 million, planned.

Ohio Fuel Gas Co., Columbus, Ohio, 56 miles, 18-24 inch, Richland County, Seneca County, Sandusky County to Toledo area, $4 million, contract for 22 miles awarded to H. L. Gentry Construction Co.

33 miles, 4 to 20 inch, various counties, Ohio, $1 million, before FPC.

21.8 miles, 12¾ and 20-inch, natural gas facilities in various counties, Ohio, $1 million, authorized.

Ohio Oil Company, Findlay, Ohio, 350 miles, 12 inch, products, from Wood River, Ill. to Chicago, 84 miles let to Panama-Williams Corp.

Oil Field Pipeline, Inc., Wichita, Kansas, 255 miles, 8-12 inch, crude, from southwest corner of Kansas to Rice County, Kansas, planned.

Pacific Gas & Electric Co., 1,300 miles, gas transmission, Alberta, Canada to Antioch, Calif., $380 million, planned.

Pacific Northwest Pipe Line Corp., Salt Lake City, 1000 miles, gas, gathering system in San Juan Basin and sales laterals in Washington plus compressor facilities, $30 million, planned.

112 miles, gas, laterals, in Washington and Idaho, $4.5 million, authorized.

Pennsylvania Gas Co., Warren, Penn., 38 miles, 8, 10 inch, gas, in Erie and Warren Counties, Penn., and Chautauqua County, N. Y., $2.6 million, authorized.

Piedmont Gas Co., Hickory, N. C., 78 miles, 2-8 inch, gas, from connection with Transcontinental Gas Pipe Line to serve customers in North Carolina, $2.6 million, authorized.

Southern Kansas Pipe Line Co., Inc., 200 miles, 6-10 inch, crude, southwestern Kansas to Arkansas City, Kansas, planned.

Southern Natural Gas Co., Birmingham, 60 miles, gas, to connect transmission system to reserves in Plaquemines, St. Bernard and Jefferson parishes, La., and waters adjoining, plus compressor, meter and regulating facilities, $8 million, authorized.

Tennessee Gas Transmission Co., Houston, 633 miles, 30 and 24 inch, gas, from Louisiana delta to Portland, Tenn. and Coudersport, Pa. to Hamburg, N. Y., before FPC.

332 miles loop lines in Tennessee, Kentucky, West Virginia, Ohio, Pennsylvania and Mississippi, 68 miles authorized and contracts let to Harford Brothers Pipe Line Contractors, Bechtel Corporation, Oklahoma Pipe Line Constructors, Pentzien, Inc. and Collins Construction Co., sub-contractor, and 264 miles, before FPC.

Compressor stations in Mississippi, Tennessee, New York, Pennsylvania and additions in Tennessee, Kentucky, Ohio and Pennsylvania, before FPC; $167 million total.

Texas Eastern-Penn-Jersey Transmission Corp., Shreveport, La., 65½ miles, gas, from Delmont, Penn., to Lambertville, N. J., before FPC.

Texas Eastern Transmission Corp., Shreveport, La., 333 miles, 14 and 30 inch, gas, pipe line plus station facilities in Louisiana, Mississippi, Pennsylvania and New Jersey, $50 million, before FPC.

Texas Eastern Transmission Corporation and Wilcox Trend Gathering System, Inc., natural gas facilities, $4 million, authorized.

Transcontinental Gas Pipeline Corp., Houston, 388 miles, gas, loop lines and gathering laterals in Texas and Louisiana and compressor facilities in Louisiana, Alabama, Georgia, Texas, South Carolina, Maryland, North Carolina, Pennsylvania and Virginia, $53.7 million, before FPC, temporary authorization for a major part.

87 miles, 24 inch, and 56 miles, 6-10 inch, gas, gathering system, Southeastern Louisiana, $14 million, before FPC.

Trans-Western Pipe Line Co., gas transmission, Four Corners area to California, planned.

Underground Storage & Exploration, Upper Darby, Penn., 394 miles, 12-inch LPG, from Moundsville, W. Va. to Newark, N. J., $9 million, approved.

International

ACT Oils, Ltd., Montreal, 400 miles, crude, Dawson Creek, B. C., to Bella Coola, B. C., before B. C. government.

Alaska-Yukon Refiners and Distributors, Ltd., Edmonton, Alta., 150 miles, products, serving Alaska and Yukon territory, $3.5 million, planned.

Andes Pipeline Corp., 500 miles, 12 inch, gas, from Villamontes, Bolivia, to Antofagasta, Chile, $30 million, planned.

Bolivian Gulf Oil Co., 201 miles, 8-10 inch, crude, from Sicasica, Bolivia, to Arica, Chile, $10.5 million, contracts let to Williams Bros.

Burmah Oil Co., Ltd., 850 miles, crude, 20 inch, from Nahorkatiya to Calcutta, proposed.

Canada Southern Petroleums, Ltd., Calgary, 400 miles, crude, from Peace River region of northeast British Columbia to Bella-Coola, planned.

Cie. de Recherche et d'Exploration de Petrole au Sahara, 530 miles, 16 inch, crude, Edjele field in Algeria to a port on Libyan coast, planned.

Consolidated Gathering Systems, Ltd., Calgary, 198 miles, crude, Sturgeon field to Edmonton, planned.

Cuban Gas Transmission Co., 650 miles, gas, from Campeche area of Mexico across Yucatan and under Gulf of Mexico to Havana, Cuba, 120 miles would be submarine, considered.

Entre Nazionali Idrocarburi, Rome, Italy, crude, from Qum field in Iran to the Mediterranean Sea, considered.

Hydrocarbons Pipeline, Ltd., Winnipeg, Manitoba, 880 miles, 6-8 inch products from Edmonton, Alta. to Winnipeg, $35 million, partial authorization.

Iraq Joint Venture Pipe Line, 1200 miles, 38-40 inch, crude, from head of Persian Gulf through Iraq to Turkish coast of Mediterranean, $840 million, planned.

Iranian Consortium, 26 inch, crude, from Gach Saran field to proposed terminal near Bandar Mashur, planned.

16 inch, crude, from Agha Jari field to Bandar Mashur, planned.

Mene Grande Oil Co., 42 miles, 16 inch, crude, from Ceuta field in Lake Maracaibo to Bachaquero terminal, $6 million, planned.

National Iranian Oil Co., 146 miles, 6 inch, crude, from Azna to Isfahan, Iran, $5 million, planned.

1000 miles, 38 inch, crude, from central Iran to the Turkish Mediterranean coast, considered.

Niogas, Austria, 160 miles, 6 to 12 inch, gas, from Fischamend field to Vienna and to nearby cities in Lower Austria, contracts to Williams Bros., Tulsa, Okla., and Costain-John Brown, London.

Petroargentina, Bahia Blanca, Argentina, 370 miles, 16 inch, crude, from Newguen to Bahia Blanca, Argentina, $40 million, planned.

Petroleos Mexicanos, 150 miles, 14 inch, gas, from J. Colomo field to Minatitlan, $5 million, planned.

80 miles, 8 inch, products, from Guaymas to Los Mochis, $1 million, planned.

150 miles, 22-inch, gas, from Monterrey to Reynosa to tie into Texas Eastern system, planned.

Royal Dutch Shell Co., 155 miles, 24-30 inch, from German Rhineland to mouth of Rhine River, planned.

Royalite Oil Co., Calgary, 380 miles, crude, from Athabasca tar sand plant in northeastern Alberta to Edmonton, planned.

Saharian Pipe Line Co. (subsidiary of Cie. Francaise des Petroles, Algerie), 100 miles, 6 to 10 inch, from Hassi Messaoud field to Touggourt, Algeria, planned.

Saskatchewan Power Corp., Regina, Sask., 80 miles, gas, Hatton gas field to Success, Sask., planned.

40 miles, gas, Moose Jaw to Regina, Sask., planned.

Stanmount Pipe Line Co., 140 miles, 10 inch, crude, Cayiga and Beaver Lake fields, N. D., to connect with Interprovincial Pipe Line, planned.

Sturgeon Pipe Line Co., 100 miles, 12-inch, Sturgeon Lake field to Trans-Mountain system, $6.5 million, planned.

Sui Gas Transmission Co., Multan, Punjab, India, 145 miles, 8-inch, gas, from Sylhet to Dacca, East Pakistan, $9 million, considered.

Trans-Canada Pipe Line, Ltd., Calgary, Alta., 2250 miles 36 inch, gas, Alberta to eastern Canada, $378 million; most contracts let.

Trans-Europe Pipe Line, 700 miles, 30 inch, main trunk, crude, from Mediterranean to northern Europe, considered.

Trans-Mountain Oil Pipe Line Co., 100 miles, loops near Kamloops, B. C. and Edson, Alta. plus pump station, tank farm and three temporary stations, $40 million, 50 miles let to Dutton-Williams Bros.

Westcoast Transmission Company, Ltd., 174 miles, 30-inch, gas, Savanna Creek gas field, Alberta, to British Columbian border, planned, $45 million.

Winnipeg and Central Gas Co., Winnipeg, Mant., 450 miles, 4-8 inch, LPG, from Tioga, N. D. to Winnipeg, Canada, $20 million, planned.

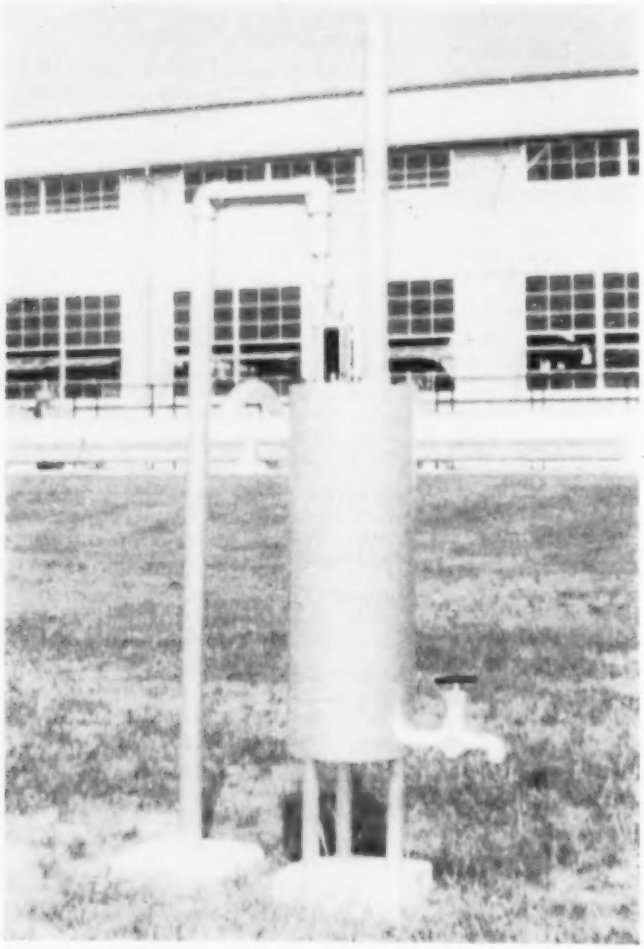
Yacimientos Petroliferos Fiscales, Buenos Aires, Argentina, 621 miles, 12-inch, products, Mendoza to San Lorenzo, Argentina, $19 million, planned.

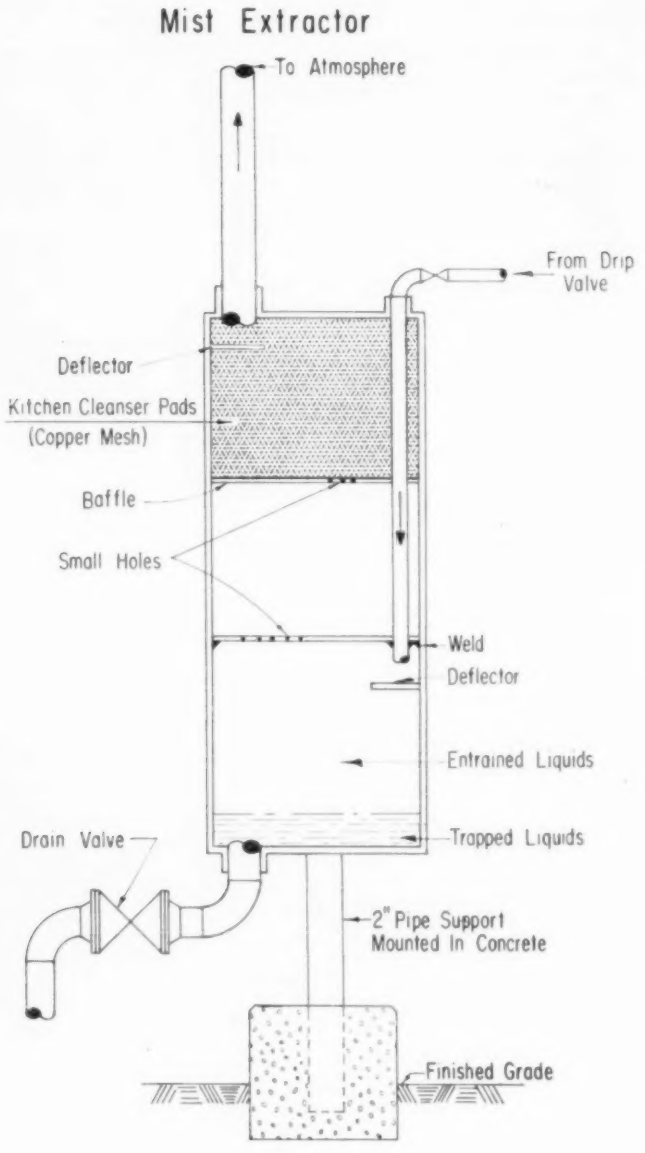
281 miles, 12¾ inch, crude, Pichanal to San Miguel Tucuman to Techint, S. A., planned.

How to do it

PIPE LINE HINTS

$10 is paid for each illustrated acceptable contribution. Mail to The Editor, PIPE LINE INDUSTRY, P. O. Box 2608, Houston 1, Texas



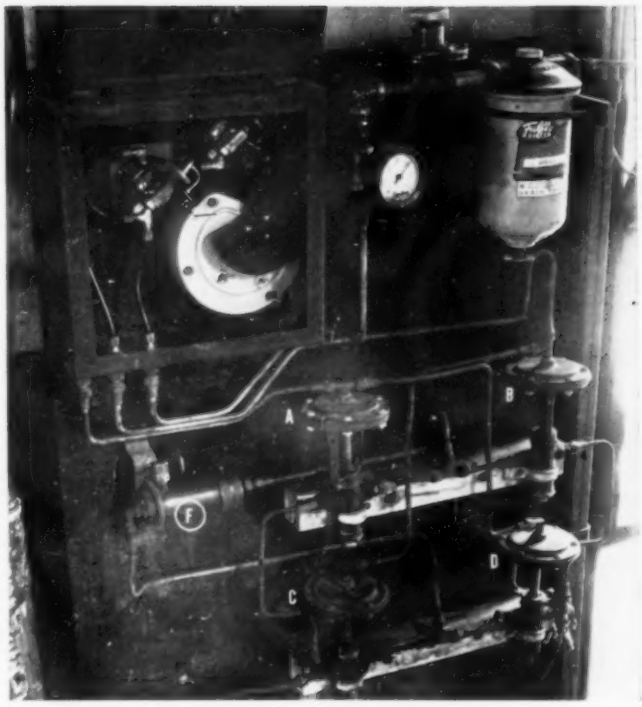


Use Mist Extractors To Aid Housekeeping

Liquids carried along with high pressure gas or air causes a messy condition when blowing down condensate traps. Use of a mist extractor will remove the liquids from the gas and cut down on housekeeping.

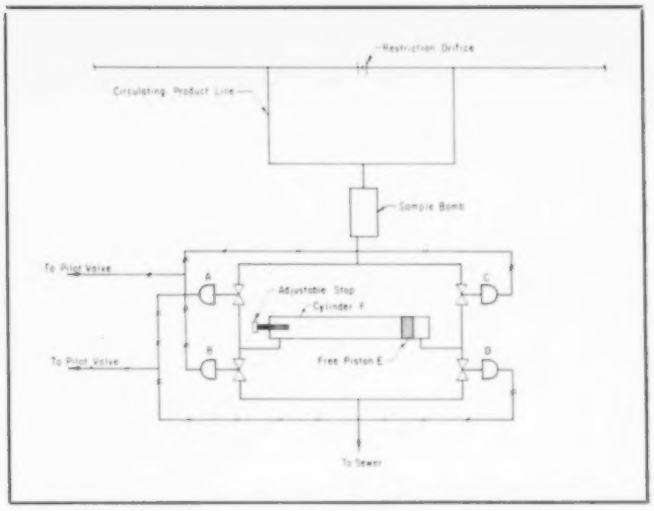
Baffles with small diameter holes drilled at different positions are welded in a piece of scrap 12-inch pipe. Making the inlet pipe smaller in diameter than the outlet lowers the velocity and pressure.

Entrained liquids fall out when passing over the baffles and through the copper mesh. The inlet pipe extends through both baffles and is equipped with a deflector to prevent turbulence of the settled liquid at the bottom.



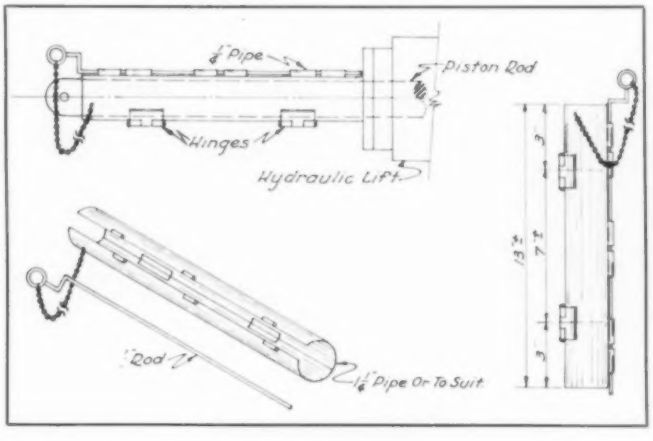
Get Representative Samples With Automatic Device

Where continuous samples are not required, this cheaper device will withdraw a sample at a constant rate. The sampler is arranged so that a fixed volume of the liquid to be sampled can be withdrawn at fixed intervals.



The volume of sample collected at each interval is controlled by altering the volume of liquid swept out by a free piston. The piston is moved in the cylinder by line pressure which is applied alternately to each side of the piston by opening either valve A or valve C. Two time-cycle controllers actuate the valves. Set the interval at which the sample is withdrawn.

The sample volume which is obtained in any given period may be adjusted in three ways. Small variations may be obtained by altering the adjustable stop on the cylinder so that the piston travel is altered. This action results in a different swept volume per stroke. Large variations may be obtained by either altering the cams so that each valve is operated more frequently per revolution or changing the rotation speed of the clock motor to produce the same effect.



Safety Clamp Holds Dozer Blade in Place

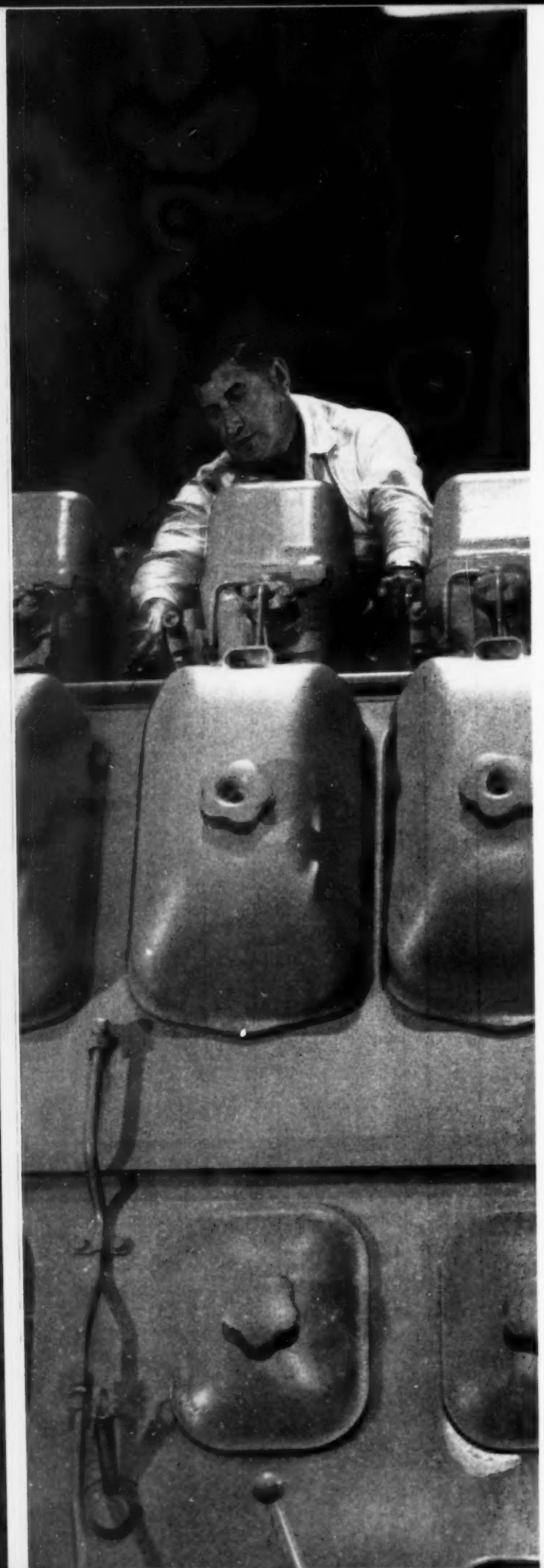
This safety clamp consists of a length of pipe which has been split in two. After splitting, the pipe is hinged so it can be clamped around the piston of the hydraulic cylinder of the dozer blade or loader on a small tractor.

With the clamp in place and locked, the dozer blade or loader cannot drop during transit of the tractor should the hydraulic cylinder fail.

Above Ground Valve Installation Has Advantages on Marsh Lines

For easier maintenance of valves located in swampy areas, install the block valve and relief valves on an exposed dog leg.

The valve assembly can be made up and fitted to pipe bent in the shop; then the entire unit is placed into the line in one piece. During construction of the main line, open ends are blanked off at ditch level. The dog leg is set in and welded up. Cementing the bell hole prevents expansion and contraction forces from putting stress on the valve connections.



AN ENGINE AS MODERN AS TODAY

The ALCO 251 diesel is modern for good reasons. The first: To save you money. ALCO engineers designed this engine with up-to-date materials, lowering maintenance and slashing weight. Through modern turbocharging and fuel injection they endowed it with more horsepower — reliable horsepower — to drive pumps, compressors, generators, shafts efficiently and economically.

All this means that you can install ALCO engines inexpensively. Heavy costly foundations, grouting, are unnecessary. It means, too, that maintenance costs are lower because modern materials wear longer, and the 251 diesel's design lets your maintenance people get into the engine faster. Replacement parts are readily available from ALCO's six regional warehouses.

ALCO can tell you much more about how the 251 diesel compares to "cast-iron" engines. Contact your nearest ALCO sales offices, or write Transportation Products, Dept. TR-5, P. O. Box 1065, Schenectady 1, N. Y.

Condensed Specifications* for ALCO 251 Diesels

No. Cyl.	Bore and Stroke (in.)	RPM Range	BHP Range	Approx. Wt Dry (lb)
6	9 x 10½	350-1000	550-900	22,100
12	9 x 10½	350-1000	1100-1800	32,650
16	9 x 10½	350-1000	1470-2400	42,000

*DEMA standards

ALCO

ALCO PRODUCTS, INC.

NEW YORK

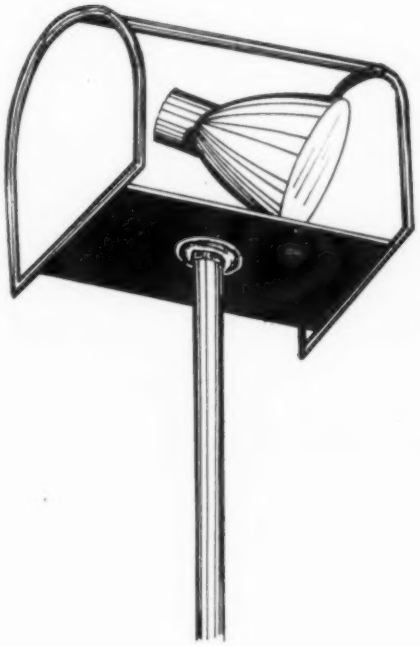
Sales Offices in Principal Cities

Locomotives • Diesel Engines • Nuclear Reactors
Heat Exchangers • Springs • Steel Pipe • Forgings
Weldments • Oil-Field Equipment

Handling Bar Unloads Long Pipe Sections

The difficult job of unloading and stacking long pipe lengths can be accomplished efficiently with a handling bar mounted on a fork-lift truck.

Pipe sections are held at either end of the bar by a hook and cable. Truck loading is easier with this system of unloading because the pipe sections do not have to be separated by spacers or other dividers. The bar attachment is easily demounted from the forks, enabling the truck to perform other handling jobs.



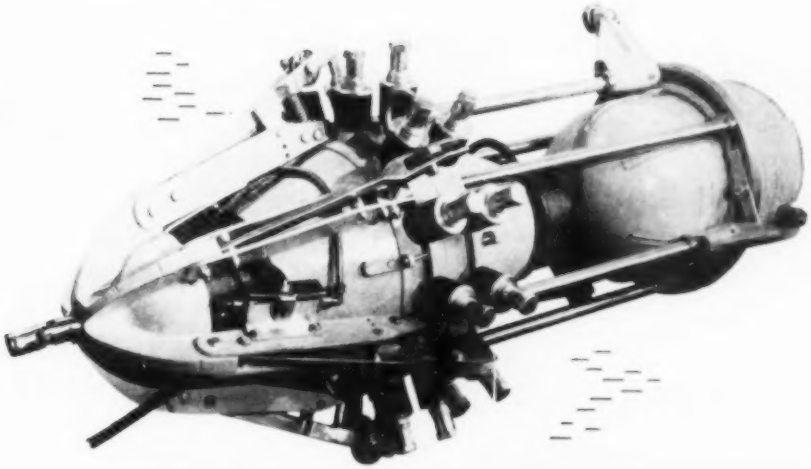
Framework Guard Reduces Breakage in Floodlights

Breakage that frequently occurs when flood lighting equipment is broken down and stacked when the spread is moved can be reduced materially by investing a few hours of a welder's time in building a light framework guard around each light unit.

The lamp illustrated, resting on a small metal platform atop a self-supporting 2-inch pipe standard, is equipped with a guard of ¾-inch pipe

PERRAULT PNEUMATIC INSIDE LINE-UP CLAMP . . .

Reduces Pipe Line-Up Time Up To 50%



PROVED IN 27 COMPLETED PROJECTS

Has now been used by major pipeline contractors in all areas; coast-to-coast, and from Mexico into Canada on lines for some of the world's most important pipeline companies. Speeds jobs because air-operated studs bring pipe into true round without hi-lo hammering; makes good stringer beads quick and easy. Rental basis: For pipe sizes from 20" thru 36". More details? Call Perrault.

Everything For The PIPELINER

Coating and wrapping and cleaning and priming machines — line traveling or stationary. Glass Pipe Wrap, Asbestos Felt Wrap, Kraft Wrap, and Rock Shield. Tar-Heating Kettles, Burners, Patch Pots and Accessories. Pneumatic-Tired Lowering-In Cradles, Adjustable Pipe Cradles, Five-roller Cradles, Tongs, Hooks, Blocks, Belts, Slings, Line-up Clamps, Hand Tools, Supplies and Equipment of every sort.

PERRAULT EQUIPMENT COMPANY

1130 N. BOSTON — TULSA, OKLA. — TELEPHONE LUther 5-1103

Bucyrus-Erie 22-B Clamshell Speeds Pipeline Ditch Cleanout

When the Michigan-Wisconsin Pipeline Co. began construction on a natural gas line from Oshkosh to Waukesha, Wis., this Bucyrus-Erie 22-B clamshell was chosen for ditch cleanout work. Shown here just south of West Bend, Wis., it was one of five 22-Bs on the spread. These machines helped keep things moving at a steady clip through terrain consisting of sand, clay, muck and rock.

The 22-B is built to work efficiently under adverse conditions. Optional tractor-type crawler mounting provides extra clearance for safe travel over rocks, stumps and most other obstructions normally encountered. Tractor-type treads have deep grousers for sure traction in soft ground and for climbing steep grades. Special sealing helps protect track-roller bearings against damage from water, dust, dirt, and grime.

Bucyrus-Eries offer the type of performance *and dependability* that keep jobs moving on schedule regardless of obstacles.

For more information on the rugged, high-output features of Bucyrus-Erie cranes and excavators, see your Bucyrus-Erie distributor today.

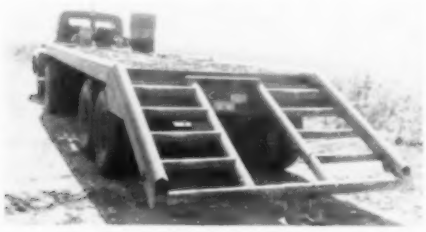
385E57

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

welded in such a way as not to interfere with all normal adjusting or servicing of the lamp; yet is sufficiently sturdy to guard against accidental breakage when it is lowered and stacked on the truck along with other equipment. A similar guard, though somewhat larger, is made for units having two lamps mounted side by side or back to back.

The small amount of time and materials involved in such a guard is more than offset by savings resulting from fewer broken lamps.



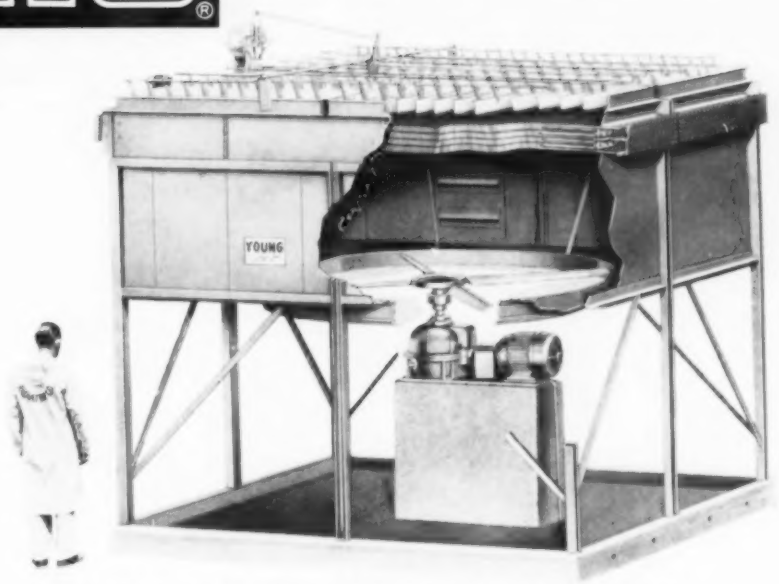
Trailer Ramp Saves Time And Facilitates Loading

On pipe line construction jobs where much loading and unloading of track-type equipment is necessary, a ramp on the back of a self-loading trailer will save time in moving. Instead of having to back up to a bank or lay down the front of the trailer, a ramp allows the tractor to be driven right up onto the trailer.

The sides of the trailer are first strengthened by splitting a piece of three-inch pipe and tack welding along the edges on each side. The ramp is made by extending these runners with three-inch pipe and extending the channel beams which run along the side of the trailer. Another piece of three-inch pipe is run across the ends of the pieces.

Space for the tracks is made by forming loaders on each side with two-inch rungs for the tracks to rest on. A set of hinged legs are made so that they will swing down and rest on the ground when loading the tractor, keeping the front of the truck from raising and preventing too large a strain on the welds. When traveling, these legs swing conveniently around inside the tracks to be clear of the road.

HC® HORIZONTAL CORE UNITS by Young



Design features that make this HC® unit a dozen ways better

Young atmospheric coolers are capable of meeting a wide range of cooling requirements. Illustrated is one of several units cooling natural gas at a pipeline compressor station. Cutaway shows some of the superior construction features.

1 • **ROUND TUBE CORES** for liquid pressures up to 150 psi or greater. Gas or vapor cooling up to 2500 psi and greater are obtainable.

2 • **MONOBLOC TUBE CONSTRUCTION** of superior design provides greater "bursting strength" with increased heat transfer surface.

3 • **REMOVABLE COVER PLATE** on end tanks for easy inspection and maintenance on cores operating up to 150 psi; removable plugs opposite each tube on cores for higher operating pressures.

4 • **TUBE-FIN ASSEMBLY.** The positive mechanical bond of fin to tube ensures maximum performance, unaffected by hot and cold cycles.

5 • **HORSEPOWER REQUIREMENTS** are lower because of decreased air flow resistance.

6 • **BAFFLE PLATE ARRANGEMENT** allows for more liquid passes—higher tube velocity—consequently takes better advantage of cooling surface.

7 • **FRAME.** Uprights and braces from heavy gauge channel steel; cover plates of heavy gauge sheet steel.

8 • **BRACING.** Plenum chamber is braced at intervals for structural rigidity, and to dampen vibration which may be caused by air turbulence.

9 • **TUBE REPLACEMENT,** where operating conditions necessitate, on both Monofin and Monobloc construction is easily accomplished.

10 • **ASME** code specifications can be furnished on cores where required.

11 • **FINS.** Straight in-line design reduces air resistance, provides for greater cleanliness.

12 • **PLENUM CHAMBER** designed to take full advantage of all heat transfer surfaces, equalizes distribution of air.

OIL FIELD AND PIPELINE REPRESENTATIVES

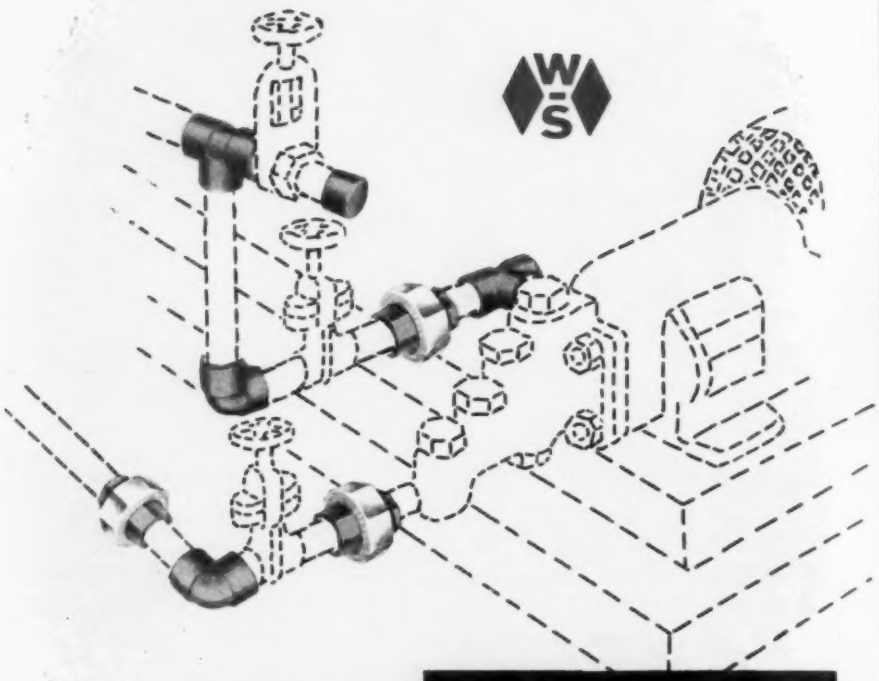
1. Central Station Equipment Co. Tucson, Arizona
2. Flournoy & Everett, Inc. Downey, California
3. Jones and Laughlin Bradford, Pennsylvania
4. J. R. Meek Company Tulsa, Oklahoma, Houston, Texas
5. Frank Walz Denver, Colorado
6. Dutton-Williams Bros. Ltd. Calgary, Alberta, Canada
7. H. J. Young Muskegon, Michigan

"WHERE QUALITY COUNTS" *Write for catalog 550 Dept. 397-K*

Young RADIATOR COMPANY
RACINE, WISCONSIN
Creative HEAT TRANSFER ENGINEERS
Executive Office: Racine, Wisconsin, Plants at Racine, Wisconsin, Mattoon, Illinois

For more data on advertised products, use Readers' Service Cards, last page.

W-S Forged Steel Fittings...



Standouts for Pump and Compressor Piping

Whether the fluid be water, steam, oil, gas or chemical solutions ... if they are being pumped at high pressure, W-S Forged Steel Fittings will protect your pump or compressor piping. They are designed and manufactured to provide maximum resistance to pressure, shock and vibration.

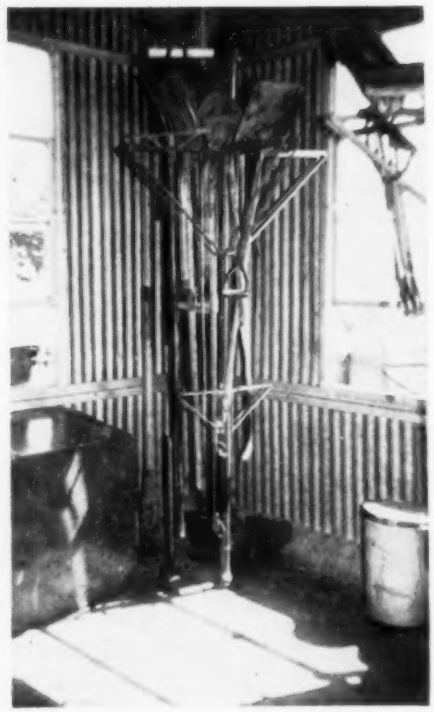
W-S Fittings are drop forged from high strength carbon steel bars and precision machined on modern automatic equipment. A new blue synthetic coating protects the fittings from rust in storage and in service.

Don't forget ... you can order your W-S Fittings in handy packaged quantities.

For detailed information on our complete line of screw-end and socket-welding forged steel fittings, write to W-S Fittings Division, H. K. Porter Company, Inc., P.O. Box 95, Roselle, N. J.

H. K. PORTER COMPANY, INC.

W-S FITTINGS DIVISION



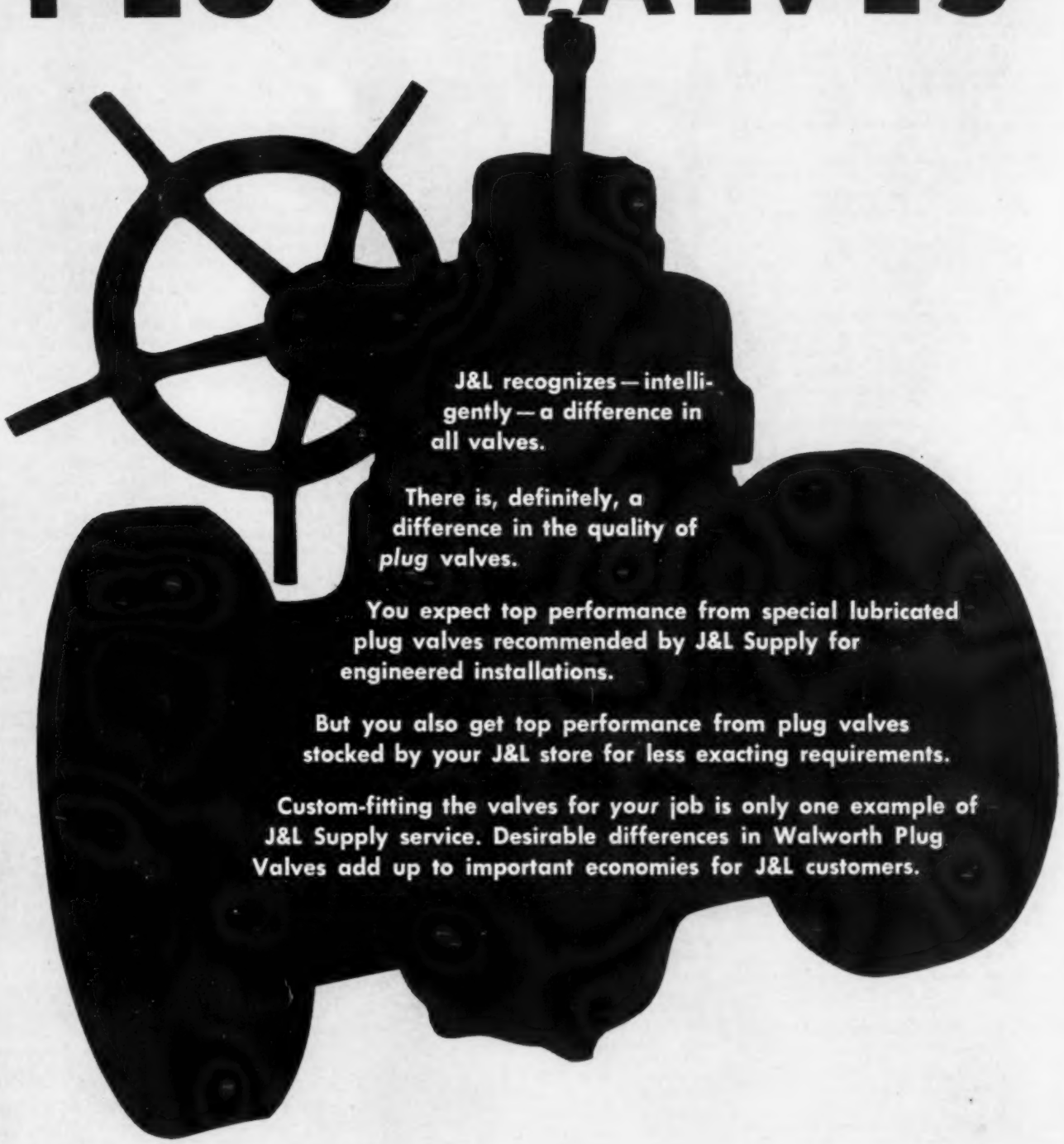
Make Convenient Rack From Scrap Material

A handy rack for storing shovels, hoes, rakes, picks, etc. can be made easily from scrap material on hand. The rack is fastened by an arm extending from the wall and fits into a ball socket at the floor. The stand is constructed of 1½-inch pipe. The dividers can be made from reinforcing rods. As shown in the picture, the rack can be installed in the corner of the shop or garage and will be completely out of the way.

How-To-Do-It Ideas Earn Money, too!

PIPE LINE INDUSTRY editors want how-to-do-it ideas, so your favorite short cut or invention could put money in your pocket! Write down the substance of your latest ideas and send them in with a picture or drawing of the installation . . . if accepted, $10 for each idea will be yours. Send those money-making ideas today to Hints Editor, PIPE LINE INDUSTRY, P. O. Box 2608, Houston 1, Texas.

J & L recognizes a difference in
PLUG VALVES



J&L recognizes — intelligently — a difference in all valves.

There is, definitely, a difference in the quality of *plug* valves.

You expect top performance from special lubricated plug valves recommended by J&L Supply for engineered installations.

But you also get top performance from plug valves stocked by your J&L store for less exacting requirements.

Custom-fitting the valves for *your* job is only one example of J&L Supply service. Desirable differences in Walworth Plug Valves add up to important economies for J&L customers.

Jones & Laughlin

SUPPLY DIVISION — Tulsa

J&L — A GREAT NAME IN SUPPLIES

26

For more data on advertised products, use Readers' Service Cards, last page.

WHO'S MEETING WHERE

October

The Society of Petroleum Engineers, AIME, 32nd Annual Fall Meeting, Adolphus, Baker and Statler Hilton Hotels, Dallas, Oct. 6-9.

American Gas Association, Kiel Auditorium, St. Louis, Mo., Oct. 7-9.

National Electronics Conference, co-sponsored by Illinois Institute of Technology, two other universities and two technical societies, Hotel Sherman, Chicago, Oct. 7-9.

AIEE, Morrison Hotel, Chicago, Oct. 7-11.

NACE, Western Regional Corrosion Control Short Course, U. S. Grant Hotel, San Diego, Oct. 22-23.

Computer Applications Symposium, Armour Research Foundation, Hotel Sherman, Chicago, Ill., Oct. 23-24.

NACE, Western Regional Meeting, U. S. Grant Hotel, San Diego, Calif., Oct. 23-25.

Seventh Biennial Permian Basin Tour, Odessa-Midland area, Oct. 23-25.

Natural Gasoline Association of America, Southern Regional, Washington-Youree and Captain Shreve Hotels, Shreveport, La., Oct. 25.

Independent Petroleum Association of America, Annual Meeting, Statler-Hilton Hotel, Dallas, Oct. 27-29.

Industrial Management Society, Industrial Engineering and Management Clinic, Hotel Sherman, Chicago, Ill., Oct. 30-Nov. 1.

November

Second International Conference on Nondestructive Testing, Chicago, Nov. 3-8.

Louisiana Polytechnic Institute, Sixth Annual Instrumentation Conference, Louisiana Polytechnic Institute, Ruston, La., Nov. 7-8.

Instrumentation Conference and Exhibit, Institute of Radio Engineers, Biltmore Hotel, Atlanta, Ga., Nov. 11-13.

API, 37th Annual Meeting, Conrad Hilton Hotel and Palmer House, Chicago, Nov. 11-14, 1957.

Natural Gasoline Association of America, Panhandle Plains Regional, Herring Hotel, Amarillo, Texas, Nov. 22.

National Association of Corrosion Engineers, Fall Meeting of Northeast Region, Penn-Sheraton Hotel, Pittsburgh, Nov. 12-14.

National Association of Corrosion Engineers, Miami Section meeting, Key Biscayne, Fla., Nov. 13-16.

December

American Society of Mechanical Engineers, Annual Meeting, Statler Hotel, New York City, Dec. 1-6.

API Oil Information Committee meeting, Biltmore Hotel, New York City, Dec. 5-6.

Third Biennial Short Course on Cathodic Protection, University of Illinois and NACE, Urbana, Ill., Dec. 9-13.

January

Tenth Annual Pipe Line Contractors Association Convention, Boca Raton Hotel and Club, Boca Raton, Fla., Jan. 19-22.

What's Happening among MEN in the INDUSTRY

L. T. Potter

D. A. Hulcy

L. T. Potter has been elected president of the **Lone Star Producing Company,** wholly-owned subsidiary of the **Lone Star Gas Company.** Potter earlier was elected president of the parent organization, succeeding **D. A. Hulcy.** Hulcy will continue with Lone Star Gas Company as chairman of the board beyond his normal retirement date of December 1, 1957, and as chairman of the Producing Company board.

•

Earnest E. Campbell is the new assistant superintendent of **Magnolia Company's Natural Gas department** with headquarters in Dallas. He was formerly district superintendent at Morgan City, La., in charge of the natural gas operations in the Gulf of Mexico. Campbell started working for Magnolia 28 years ago in Oklahoma.

James A. Upton has been transferred to Morgan City to assume the duties of Campbell. **Charles A. Freeman** replaces Upton as superintendent of the Seeligson District at Premont, Texas. **Donald L. Nichols** has been moved from Healdton, Okla., to the Pegasus district near Midland, Texas, and will replace Freeman as assistant superintendent there.

•

Frank M. Foster, vice president of **Southern California Gas Company,** has been elected a member of the board of directors of the utility.

Foster has been vice president of the gas company since January, 1955. He will continue to be responsible for sales, advertising and public relations functions of the company.

He first joined the utility in 1936, and held various management positions. He was named general sales manager in 1949.

Frank M. Foster

•

Robert M. Chan of Dallas is a new member of the board of directors of **Transwestern Pipeline Company** and will also serve as an advisor to the new gas pipe line corporation, particularly in connection with gas procurement.

Transwestern and Chan are opening offices in Dallas. He retired recently as first vice president of Magnolia Petroleum Co. after 22 years with the firm.

Transwestern Pipeline Company is owned jointely by **W. K. Warren** of Tulsa, Monterey Oil Company of Los Angeles, and **J. R. Butler** and associates of Houston. Transwestern proposes to lay a pipe line to transports gas from the Four Corners area being developed in Utah, Colorado, New Mexico and Arizona to industrial and others users in California.

•

Paul F. McBride has been named chief engineer for **Pacific Northwest Pipeline Corporation.** McBride, who has been associated with the natural gas transmission company from the beginning of construction, has been acting chief engineer for several months. He will be responsible for all phases of new construction as well as other operating and maintenance engineering matters.

•

W. E. Brown, superintendent of compressor design engineering for **Texas Gas Transmission Corporation,** has retired after devoting 50 years to the engineering field.

Brown has been an employe of Texas Gas since October of 1949. He was only 15 years of age when he became an engineering apprentice with Birdsboro Steel Foundry Co., Birdsboro, Penn. After Completing his four-year apprenticeship he was employed by various engineering firms.

W. E. Brown

Later he worked with natural gas and product pipe line companies including Panhandle Eastern Pipe Line Company, Great Lakes Pipeline Company and Michigan-Wisconsin Pipeline Company. He came to Texas Gas from the latter.

•

Mannix Ltd., active in Canadian construction for over 50 years, has announced the adoption of a new firm name—**Mannix Co. Ltd.**

The change of name was accompanied by several executive appointments. **W. F. Sharon,** formerly president of Sparling Tank & Mfg. Company, has been named a director and executive vice president. **P. J. Soukup,** formerly general manager, has been named vice president in charge of construction.

The board of directors of Mannix Co.

CPS announces . . .

a new line of low-cost plastic crossing insulators

A new line of molded plastic crossing insulators is now available from CPS. Used to support pipe lines and to insulate the pipe from the casing in under-road crossings, the tough Maloney Type 57 plastic spacers provide positive insulation, high impact strength, good non-abrasive qualities and good compression strength.

Made of fiberglass polyester resin, the all-new design features four rounded runners which provide complete insulation and eliminate the possibility of "hanging up" when the line is dragged through the casing. The Maloney Type 57 plastic spacer has no age deterioration and extremely low water absorption.

. . . . . .

Write today for Plastic Crossing Insulator literature. Available from stock in pipe-to-casing sizes from 2 x 4 to 10 x 14.

TULSA
4142 South Peoria
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NEW ORLEANS
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(Golden) P. O. Box 291
CRestview 9-2215

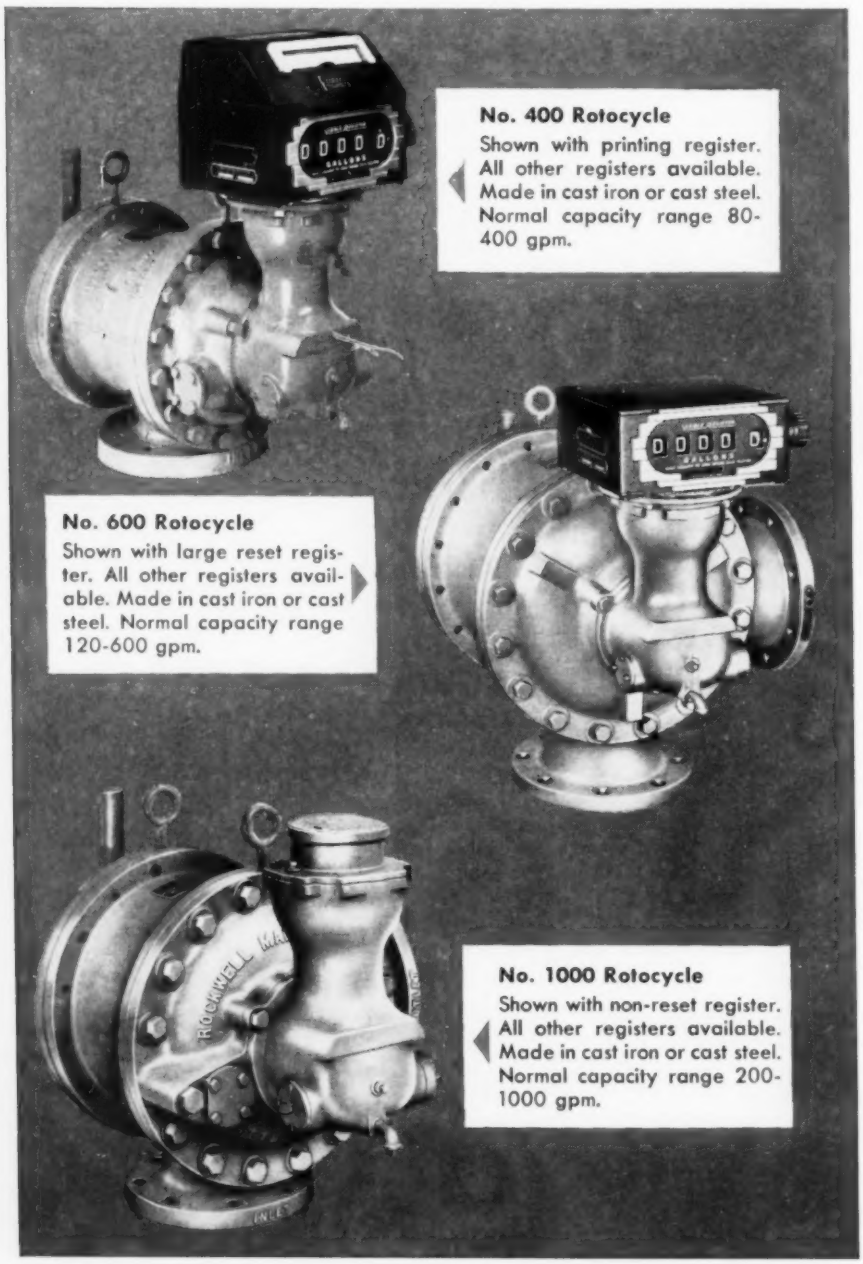
CORPUS CHRISTI
1620 South Brownlee
TUlip 3-7264

6449

ROCKWELL *ROTOCYCLE* METERS

with New Crank Control

The rotor in these meters is now controlled by a simple coordinated linkage. The new design does not alter the proven "floward" operating principle. It does enhance performance by providing the advantages of increased capacity, fewer parts, permanent timing and quiet operation. These rotors are interchangeable with rotors in earlier model Rotocycle meters.



No. 400 Rotocycle
Shown with printing register. All other registers available. Made in cast iron or cast steel. Normal capacity range 80-400 gpm.

No. 600 Rotocycle
Shown with large reset register. All other registers available. Made in cast iron or cast steel. Normal capacity range 120-600 gpm.

No. 1000 Rotocycle
Shown with non-reset register. All other registers available. Made in cast iron or cast steel. Normal capacity range 200-1000 gpm.

...and all to make

things that

AIR ELIMINATORS

Rockwell air eliminators are engineered to remove all entrapped gases in the liquid before they reach the meter and adversely affect accuracy. In-line connections simplify installation. Unit assembly of all working parts eases routine maintenance.

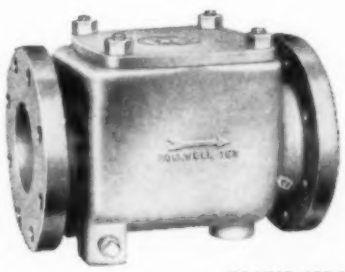
ROCKWELL

PITTSBURGH 8, PA. Atlanta Boston Charlotte
Chicago Dallas Denver Houston Los Angeles
Midland, Tex. New Orleans New York
N. Kansas City Philadelphia Pittsburgh

these Rockwell Accessories your metering more profitable

make your meters go—that improve measurement

STRAINERS



IN-LINE STRAINER

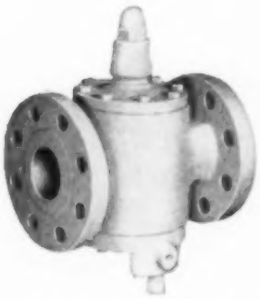
ANGLE STRAINER

Both types of strainers prevent foreign matter in liquid from damaging the meter. Both have large effective screening area and the economy of re-usable O-ring cover gaskets.

ANGLE ADAPTORS

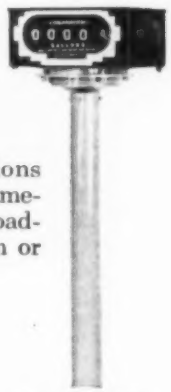
Angle adaptors are used for ease of reading when meters are installed below ground, such as in airport pits.

RATE LIMIT VALVES



These valves are designed for use at meter outlets to control maximum flow rates and thus prevent over-speeding. They also have utility in providing equal distribution of liquid through a line of meters.

REGISTER EXTENSIONS

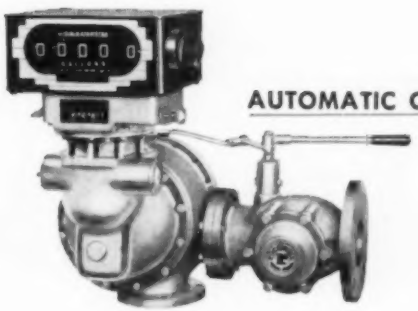


Register extensions permit installing meters under the loading rack platform or underground.

SWIVEL ADAPTORS

(Not Illustrated)

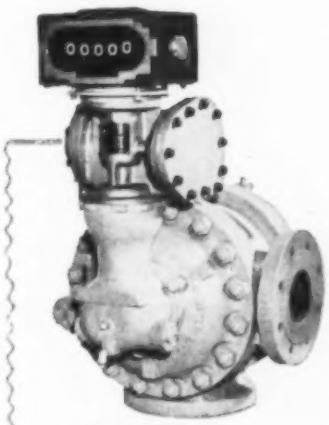
These adaptors permit the meter register to be rotated through a 360° turn for easy reading from any angle.



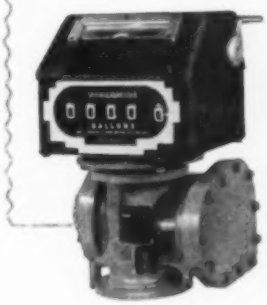
AUTOMATIC QUANTITY CONTROL VALVES

Multistage type, for smooth non-shock shut-off of predetermined volumes of liquid. An invaluable aid when topping off loads or processing with liquids.

REMOTE REGISTRATION SYSTEMS



TRANSMITTER



RECEIVER

This remote registration system permits centralized control over all metering operations. It transmits meter registration from a remote location, such as on a loading rack, directly to a receiving register of the printing type by synchronous electrical impulse. The transmitter is mounted atop the meter at the point of measurement. Its matching receiver is mounted in a central control office.

MANUFACTURING CO.

San Francisco Seattle Shreveport Tulsa

In Canada: Rockwell Manufacturing Company of Canada, Ltd., Toronto, Ontario

Ltd. includes **F. C. Mannix**, president and chairman of the board; **W. F. Sharon**, executive vice president; **P. J. Soukup**, vice president; **J. A. Scott**, director; **E. Connelly**, director; **E. W. Costello**, director; **J. G. Kingsmill**, controller.

•

William T. Ivey, statistician and planning engineer for **Southern Natural Gas Company**, has been appointed a member of the American Society of Civil Engineers' Pipeline Executive Committee. He will serve in that capacity until October, 1961.

•

Ed Morris of Paoli, Kansas, has assumed the position vacated by **Fred Hawkins** at the **Panhandle Eastern Pipeline Company's** office.

G. L. Maciula

Ellis Orr

Service Pipe Line Company recently named **G. L. Maciula** chief engineer replacing **A. H. Newberg.** Newberg resigned to enter the ministry in the Episcopal church. Maciula has been with Service Pipe Line since 1946. He served as division chief engineer stationed in Lubbock, Texas, senior engineer stationed in Tulsa general headquarters, assistant manager of the Oklahoma division at Shawnee and in 1956 was transferred to Raytown, Mo., as assistant manager of the Missouri-Illinois division.

Ellis Orr, superintendent of the company's Drumright, Okla., district, will replace Maciula in the Missouri-Illinois division. Orr has been with Service Pipe Line since 1933 and has served as division industrial relations supervisor before assuming the Drumright district position in 1950. **J. J. Wright, Jr.**, will succeed Orr.

•

Joseph C. Plourde has joined **Northern Natural Gas Company** as assistant treasurer. Prior to joining Northern, Plourde had eight years of financial experience in New York City. His most recent position was that of manager of the Public Utilities Research Division of the National Securities and Research Corporation of New York.

•

R. H. Westhoff has been named division gas superintendent for **Pan American Petroleum Corporation's** Central division.

The gas superintendent's position was newly created in the division. Westhoff was formerly Central division gas engineering supervisor, joining a Pan American predecessor firm as a refinery engineer at Vivian, Louisiana, in 1929.

•

W. R. Sinclair is the new counsel for Production and Pipe Line department of the **British American Oil Company Limited** at Calgary, Alberta. He will take the position vacated by **G. M. D. Blackstock**, recently appointed general counsel of the company.

W. R. Sinclair

Sinclair is a member of the Executive of Calgary Bar Association and of the Canadian Bar Association. He was formerly with the Law department of Canadian Gulf Oil Company.

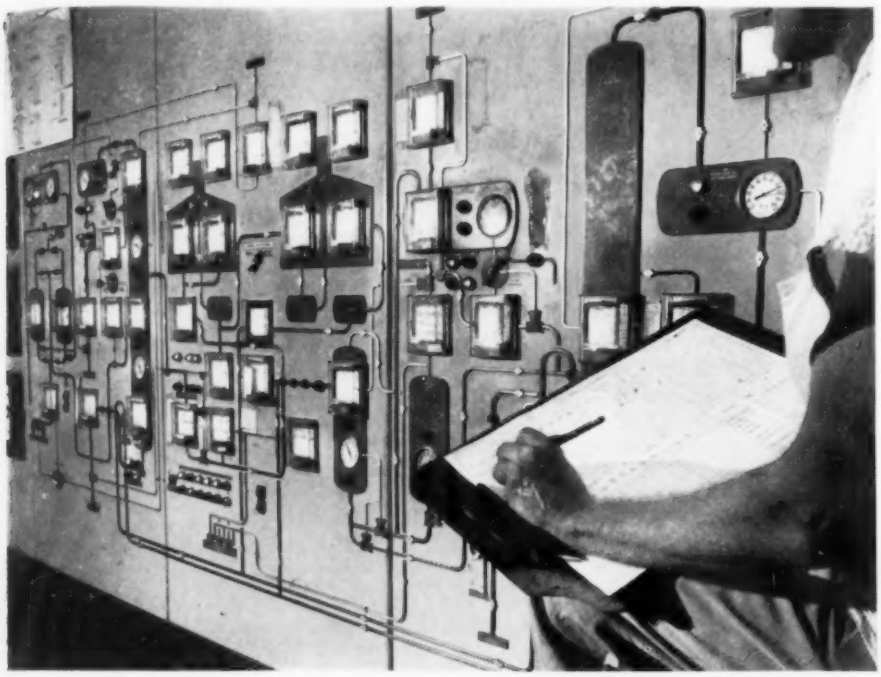
•

Appointment of a new Pipeline Department superintendent, Louisiana Division manager, and assistant superintendent of the Pipeline Department has been announced by **Texas Gas Transmission Corporation.**

Under the appointments, **E. F. Hindman** becomes superintendent of the Pipeline Department; **W. O. Davis** succeeds Hindman as manager of the company's Louisiana Division, and **Edward Hamric** becomes the Pipeline Department's assistant superintendent. Davis and Hamric have been assistants to the pipeline superintendent.

•

Charles T. Carolan, assistant treasurer, **Suburban Propane Gas Corporation; Joel P. Dyer**, secretary, **Bell Oil and Gas Company** and **Arthur L. Wallace**, secretary-



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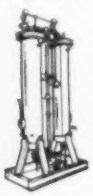
Get increased precision and longer life by protecting your air-operated instruments with Kemp Oriad Dryers. Kemp dryers clean and desiccate air supplies to stop condensation, corrosion and jamming.

In operations across the country, Kemp Oriad Dryers are giving dependable performance, year after year, with only routine care and maintenance.

Your Kemp Representative will show you how *your* instruments can get maximum protection at minimum cost. Or write us direct for Bulletins D-102 and D-103. The C. M. Kemp Mfg. Co., 405 E. Oliver St., Baltimore 2, Md.

KEMP
OF BALTIMORE



Available in all sizes for automatic, semi-automatic, or manual operation. Steam or electric reactivation.

ALL OPERATIONS ARE COMPLETELY INDEPENDENT—In addition to eliminating shifting time, *Independent-Travel* allows the operator to swing and hoist the load while travelling. Whether to save time or to jockey the boom around obstacles, the operator can swing the boom while his machine is travelling in either direction. This optional feature can be used with any front-end attachment.

Getting 9 hours' output in 8

Independent-Swing-and-Travel is available on 11 Link-Belt Speeder models. Eliminates shifting . . . saves 20-30 seconds each move

Link-Belt Speeder users are setting new high-production standards by equipping their machines with *Independent-Swing-and-Travel*. Why? It eliminates time losses ordinarily occurring when the operator shifts from swing to travel and from travel to swing. With *Independent-Travel* shifts are eliminated and the machine can swing and travel simultaneously . . . you can jockey the boom around obstacles in tight quarters, move away from bank cave-ins in split seconds!

If you'd like complete details, proof that *Independent-Travel* can up output . . . cut maintenance and spare parts costs, too — see your Link-Belt Speeder distributor or write Link-Belt Speeder Corporation, Cedar Rapids, Iowa.

MORE USABLE HORSEPOWER — Size for size, Link-Belt Speeder shovel-cranes utilize more of the engines' available horsepower. This bonus pays off in added power at the bucket teeth, greater line pull plus extra power to swing, hoist and travel. Although it gets more usable power and line pull out of the same engines used in other shovel-cranes, a Link-Belt Speeder remains well within the engine manufacturers' recommended operating speeds.

14.124-A

It's time to compare . . . with

LINK-BELT SPEEDER

Builders of a complete line of shovel-cranes . . . with exclusive Speed-o-Matic power hydraulic controls

For more data on advertised products, use Readers' Service Cards, last page.

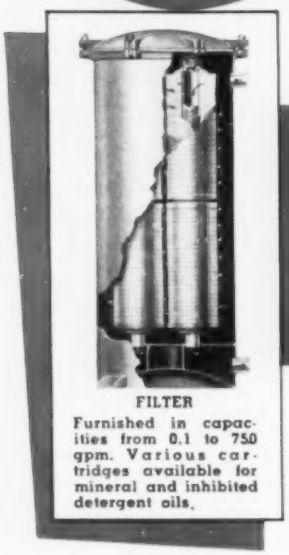
Clean Oil

SAVES YOU MONEY!

HILCO

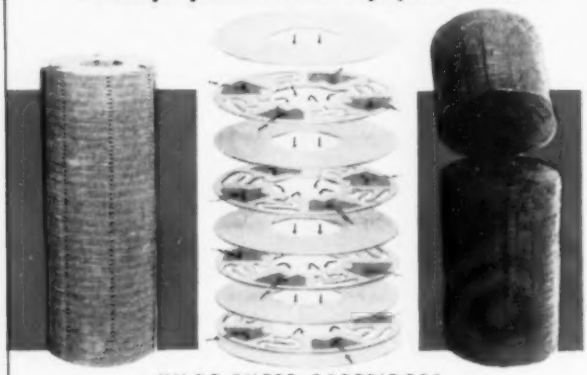
OIL MAINTENANCE EQUIPMENT

. . Keeps your Oil and Equipment Clean



FILTER

Furnished in capacities from 0.1 to 750 gpm. Various cartridges available for mineral and inhibited detergent oils.



HILCO FILTER CARTRIDGES

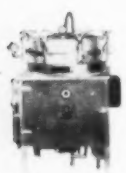
The result of much research in the field of lubricating, fuel and industrial oil filtration, the new patented HILCO Filter Cartridges meet the need for tremendous filtering area, low pressure drop and high dirt storage capacity. Above: Fig. 1 is a new cartridge; Fig. 2 is a used cartridge (note that pockets are completely filled and the outer surface covered with solids); Fig. 3 shows the flow of oil, the dark area represents dirty oil passing into the pockets while filtered oil (white area) passes into "S" shaped section.

HILCO Purification Means *Complete* Oil Purification . . .

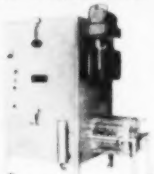
You get absolute removal of sludge, acids, carbon, water and fuel dilution with a properly selected HILCO. Clean oil saves you money. Expensive maintenance is reduced, equipment shut-downs practically eliminated, lost man hours and cuts in production become a thing of the past. HILCO continuous, all electric, automatic purification keeps your oil clean and in top condition at all times. You receive the full capacity and economy of your equipment.

HILCO offers a wide range of oil purification units to meet every oil conditioning problem. HILCO units are manufactured in both stationary and portable models. Write us about your purification needs . . . recommendations are given with no obligation. Let HILCO put its 25 years of experience in oil purification to work for you.

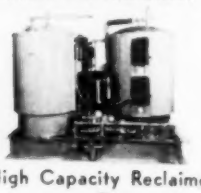
THERE'S A HILCO FOR EVERY LUBRICATION AND FUEL OIL FILTERING PROBLEM



Oil Reclaimer



Purifier Re-Refiner



High Capacity Reclaimer

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• Recommendations at no obligation!!

THE HILLIARD Corporation

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treasurer, **Iverson Supply Company**, have been elected to membership in the Controllers Institute of America.

W. G. Palmer

E. L. Jones

Mannix Gill Limited, a firm associated with Mannix Co. Ltd. and the J. B. Gill Co. of Los Angeles, Calif., and Tulsa, Okla., has announced two executive appointments.

W. G. Palmer, formerly chief engineer, has been named vice president of engineering. **Edward L. Jones**, formerly with C. F. Braun & Co., has joined the firm as chief engineer.

•

The Pipe Line Committee of the Instrument Society of America is now being organized for cooperation with pipe line companies and control equipment manufacturers for effective solutions to the instrument and control problems facing the petroleum and gas pipe line industries.

Ivan W. Schmitt, El Paso Natural Gas Company, and **Max T. Nigh**, Service Pipe Line Company, are vice chairmen of the ISA Transportation Committee in charge of organizing this activity. Other members of the Pipe Line Committee are **J. F. Conneran**, Arabian American Oil Company; **Fred S. Jones**, Platt Pipe Line Company; and **Joseph Purvine**, Cities Service Pipe Line Company.

Those interested in pipe line instrumentation and automatic control are encouraged to volunteer in contributing their effort to the more effective work of the two subcommittees. Anyone interested in serving on these committees is invited to write to **T. C. Schroeder**, chairman of the Instrument Society of America Transportation Committee, at Union Switch and Signal Company, Swissvale, Pennsylvania.

•

Frank N. Seitz has been elected to the board of directors of **Southern Counties Gas Company.** Seitz, a vice president of the utility, joined Southern Counties in 1950 and has headed its sales activities since that time.

DEATHS

Charles C. Pollard, 45, and **Edward D. LeBoeuf**, 29, were killed in a helicopter crash August 29 while making an oil pipe line survey 70 miles west of Calcutta, India, for Collins Construction Co. of Port Lavaca, Texas.

Natives of Victoria, Texas, LeBoeuf and Pollard were chief engineer and foreign operations manager, respectively, of the firm.

The survey is being made for the Assam Oil Co., a British firm planning a pipe line from Asam, in Northeast India, to Bihar, northwest of Calcutta.

If it's BLUE-dyed Asbestos

YOU CAN BE SURE IT'S FLEXITALLIC

In every asbestos-filled Flexitallic Gasket, the blue dye in the Canadian asbestos filler provides positive product identification. When you see Flexitallic Blue, you can be sure it's a genuine Flexitallic Spiral-Wound Gasket . . .

- the original spiral-wound gasket made exclusively by this Company since 1912.
- constructed to meet specific conditions of thermal and mechanical shock, vibration, weaving and other joint stresses.
- flexible and resilient, self-adjusting to changes in operating conditions—affording greater safety, dependability, and long service life.

In every field of high-pressure seal, look for Flexitallic Blue. It's for your protection.

FLEXITALLIC GASKET CO.
8th & Bailey Sts., Camden 2, N. J.
Representatives in principal cities

Flexitallic®
SPIRAL-WOUND GASKETS

FOR PIPE FLANGES, PRESSURE VESSELS AND PROCESS EQUIPMENT

* Flexitallic is a registered trade name. No one else can make a Flexitallic Gasket. Look for *Flexitallic Blue* — it's our exclusive blue-dyed Canadian asbestos filler.

For more data on advertised products, use Readers' Service Cards, last page.

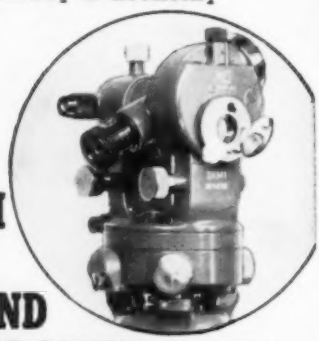
*IN TEXAS

...AND THE WORLD OVER

KERN SURVEYING INSTRUMENTS

*The Bridge Division of the State of Texas Highway Dept. uses Kern Instruments

WORLD FAMOUS FOR
Working Speed
Operational Simplicity
Accuracy & Economy



DKMI TEN SECOND THEODOLITE (with optical micrometer)

- Exceptional portability and precision.
- Readings automatically ... AT A GLANCE.
- Direct reading to 10". Estimation to 1". Average working accuracy —3-4 secs.
- Can be used with electric lighting unit for night work.

KERN CENTERING TRIPOD

Unique—a Kern first! Centers instruments in seconds with remarkable accuracy. Assures exceptional stability with ball-and-socket head, supporting instrument coupling.

★

Write for Brochure DK 518 - 8

PROMPT, RELIABLE SERVICE
FACTORY TRAINED PERSONNEL

Kern SWISS

The FINEST in SURVEYING EQUIPMENT

KERN INSTRUMENTS INC.
120 Grand St., White Plains, N.Y.

What's Happening among SERVICE and SUPPLY MEN

Cooper-Bessemer Announces Houston Branch Promotion

Earl P. Martin, senior sales engineer for Cooper-Bessemer Corp., is the new assistant branch manager of the organization's Houston office.

Earl P. Martin

In his new position Martin will assist with the management of Houston office and warehouse facilities at 2705 Danville Street. He was formerly associated with the Foxboro Co. and the Rockwell Manufacturing Co. before coming to Cooper-Bessemer in 1939.

Carl Danielson Appointed Midwestern's Houston Manager

Carl G. "Dan" Danielson, formerly with Midwestern Engine & Equipment Co., Inc., has been named manager of the Houston branch of Midwestern Pipe Line Products Company.

BorTunCo Is New Trade Name For Texas Road Boring Co.

Boring and Tunneling Company of America with the trade name BorTunCo is the new name for Texas Road Boring Company, it has been announced by Bill Horner and Gil Turner, partners of the firm.

The organization, headquartered in Houston, also maintains division offices in Kansas City, Mo., Atlanta, Ga., Dallas, Horner and Gil Turner, partners of the and furnishes equipment and technical supervision for allied corporations.

Peake Made Full Partner Of S. D. Day Company

David W. Peake has been made a full partner of S. D. Day Company of Houston. He joined the firm in 1950 and spent his first four months obtaining pipe line crew experience.

David W. Peake

He was formerly sales manager responsible for marketing operations, including advertising, promotion, and public relations.

S. D. Day Co. was organized in 1949 and is manufacturer's representative in the pipe line coating and allied products fields for the Ruberoid Company nationally, Pittsburgh Coke & Chemical Company in Texas, New Mexico, Louisiana and Mississippi and American Coating & Supply Company's "Fieldjointer" line in the South.

Dresser to Manufacture Plastics Products for Pipe

An announcement was made recently of the formation of a Plastics Products Department at Dresser Manufacturing Division, Dresser Industries, Inc.

Purpose of the new department is to develop and market plastic products for the joining, repairing and maintenance of pipe. Several products in this line will soon be announced for sale.

Hamer Valves Inc. Announces Two New Sales Representatives

The appointment of two new sales representatives, the Henry Kalz Company and Barber Machinery Limited have been announced by Hamer Valves, Inc. Territories for the Henry Kalz Company include the entire state of Oregon while Barber Machinery Limited will represent the Hamer line in the Canadian provinces of Saskatchewan, Alberta and the Peace River district of British Columbia.

Van Arsdale Is Vice President Of Jensen Engineering Company

Jensen Engineering Company has announced the appointment of L. R. Van Arsdale as vice president. Van Arsdale has been sales manager of the company for the past two years and will continue in this capacity. His further duties will include expansion of the present line of tank mixers manufactured and sold by the firm and introduction of new products currently being designed.

Petrolite Names Clote To Advertising Position

John Clote, formerly field engineer for the Tretolite Co., division of Petrolite Corp. at McPherson, Kansas, has been named assistant advertising manager of Petrolite, assigned to the St. Louis headquarters. Clote joined Tretolite in 1952 at McPherson. He served as district editor for the Oil and Gas Journal at Tulsa and later at Houston.

John Clote

Mason-Neilan Lists District Sales Managers, Opens New Office

Mason-Neilan, Division of Worthington Corporation, has announced new Pittsburgh and Seattle district sales managers and a new district office at Wilmington, Delaware.

John W. Brown, formerly manager at Seattle, Washington is appointed manager of the Pittsburgh District, replacing A. Blair Powell, recently promoted to general sales manager. Thomas S. Robinson, a

WITH THIS NEW ROEBLING CATALOG EVERYTHING IS SIMPLIFIED!

Recommendations

Sling Selection

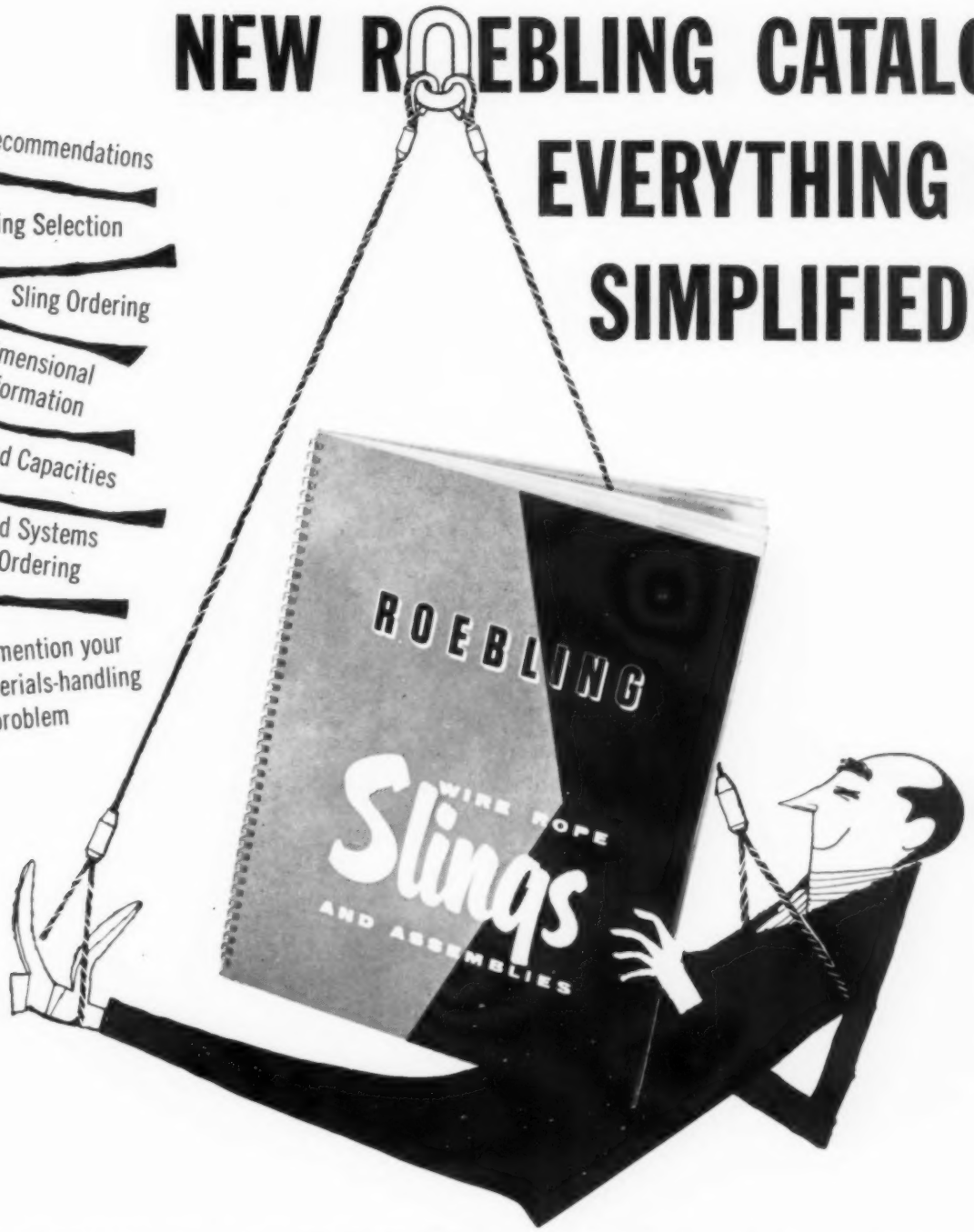
Sling Ordering

Dimensional Information

Rated Capacities

Coded Systems for Ordering

. . . Not to mention your own materials-handling problem



This 52-page book contains concise, easy-to-find and easy-to-use information on:

All-Purpose Slings · Roegal® Cable-Laid Slings · Flatweave Slings
Railroad Slings and Special Assemblies · Fittings
General Slings Facts

The text is supplemented by drawings and photographs. This wealth of reference is yours simply for the asking. By filling out the coupon and mailing it, you'll get your copy *faster*.

ROEBLING

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J.

Branch Offices in Principal Cities

Subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION
Dept. MM, Trenton 2, N. J.

I'd like a copy of your new Sling Catalog.

Name_____

Company_____

Address_____

City_____ Zone_____

State_____

For more data on advertised products, use Readers' Service Cards, last page.

here's the NEW HD-21...

DESIGNED AND BUILT TO FIT TO

Now . . . major advances make the Allis-Chalmers HD-21 more productive than ever . . . capable of handling big-tractor jobs of every kind with the efficiency and dependability all pipeline contractors want and need.

New 225-net-hp turbo-engine

New weight—45,500 lb (bare)

New power train and torque converter effectiveness, simplicity

New longer track for matched traction, flotation

New operating ease and control with work-saving decelerator

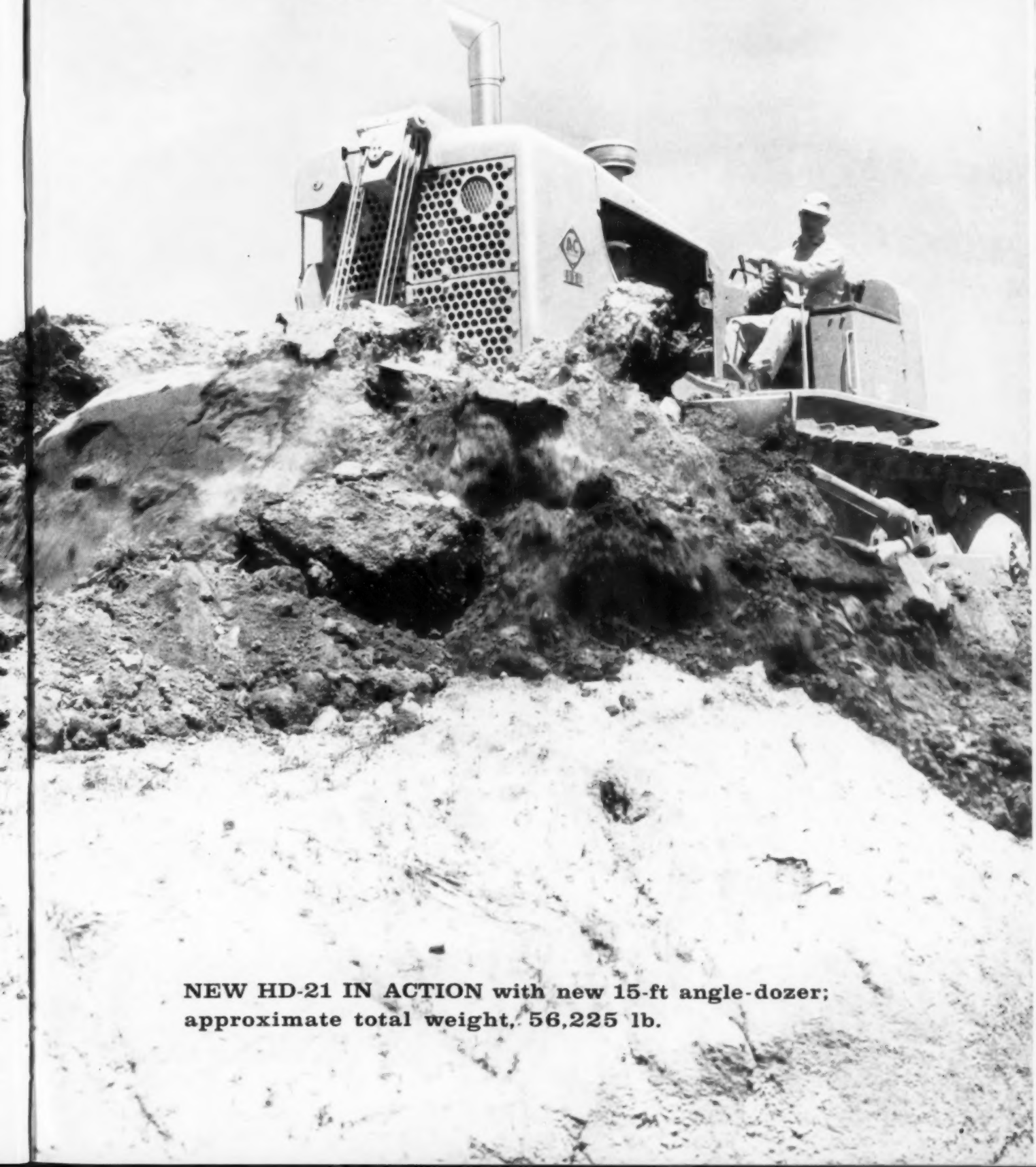
New heavy-duty matched dozers

Here's a big tractor you can depend on to help you bid with confidence in your cost estimates. Your Allis-Chalmers dealer will be glad to talk to you about the new "21" . . . and to prove its value in a working demonstration on your job. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

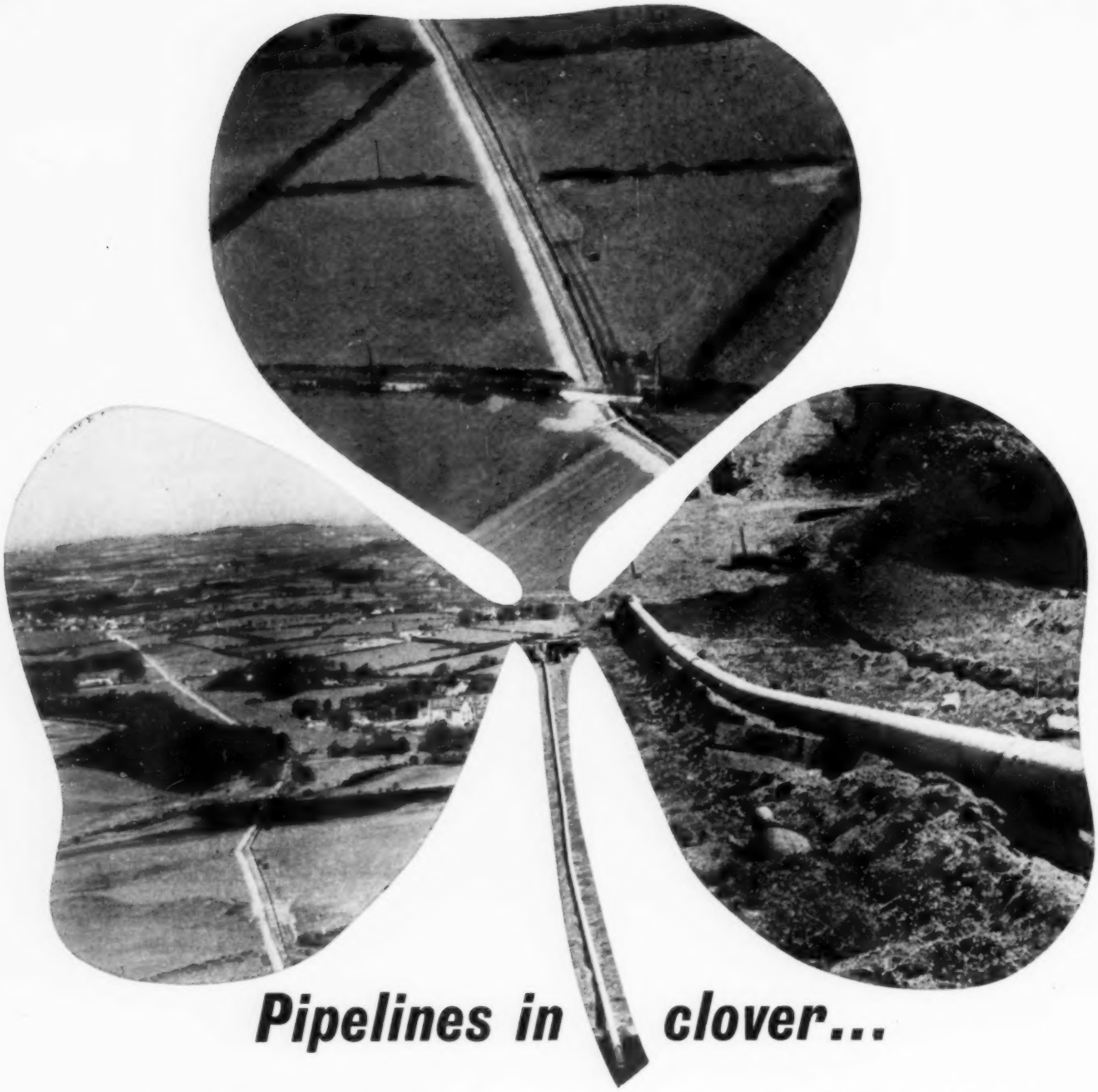
ALLIS-CHALMERS

Engineering in Action

T TODAY'S BIG-TRACTOR JOBS!



NEW HD-21 IN ACTION with new 15-ft angle-dozer; approximate total weight, 56,225 lb.



Pipelines in clover...

A pipeline wrapped in Fibreglass has nothing to worry about — because asphaltic or coal-tar enamel strengthened with Fibreglass pipewrap has *maximum* resistance to corrosion, soil stress and backfill damage.

Fibreglass reinforced tissue is specifically designed for high-speed machine application to oil and other pipelines. It offers unequalled porosity characteristics which give an even and immediate bleed-through of enamel. Fibreglass reinforced tissue does not lie on the surface of the enamel, but is positioned in the body of the finished coating. The special binders developed by Fibreglass in parallel-reinforced pipewrap tissue not only help to provide extremely high tear and tensile strength, but will withstand immersion under load in hot enamel at over 500 degrees Fahrenheit.

...are wrapped in FIBREGLASS TRADE MARK

FIBREGLASS LTD., ST. HELENS, LANCASHIRE · ST. HELENS 4224

sales engineer at the Skaneateles office since 1951, has been promoted to district manager at Seattle.

The Delaware River Valley will now be served by new district office at Wilmington, Del., with A. S. Chatfield as manager.

Duane DeLong

D. F. Van de Roovaart

Link-Belt Speeder Corporation Announces 2 Sales Appointments

Dave Van de Roovaart and Duane DeLong have assumed positions of assistant sales manager and district representative for the Mid-Southern territory, respectively, in the Link-Belt Speeder Corp.

In his new duties at the factory in Cedar Rapids, Iowa, Van de Roovaart will aid Sales Manager Gordon W. Rowand in marketing the Link-Belt Speeder crawler and rubber-tired shovel-cranes. He joined the Link-Belt Speeder parent organization, Link-Belt Co., in 1936 and transferred in 1939 to the Link-Belt Speeder in Cedar Rapids where he headed the Cost and Estimating departments and later served as district sales representative for the Rocky Mountain and Mid-Southern territories.

DeLong, a member of the Link-Belt Speeder organization since 1950, will headquarter at Knoxville, Tenn., and be the sales representative for the area encompassing the states of Kentucky, Tennessee, Virginia, West Virginia and North Carolina. Prior to his new appointment, DeLong was a field service representative and earlier worked with the company's Production. Sales and Sales Promotion departments.

Tretolite Names Siess Assistant Sales Manager

Charles P. Siess, Jr., formerly assistant division manager at Anaco, Venezuela, for South American Petrolite Corp, has been appointed assistant to James E. Stockton, Jr., general sales manager for the Tretolite Co., division of Petrolite Corp.

Charles P. Siess, Jr.

Now located in the St. Louis home office, Siess served more than four years with the company as field engineer specializing in corrosion problems in the Arkansas, North Louisiana, Mississippi and East Texas area. His duties in South America included working in the production and refining phases of the industry. He covered both the Maracaibo region and Trinidad area.

Bucyrus-Erie Names Meuser Industrial Relations Manager

Otto J. Meuser, Richmond, Ind., has been appointed industrial relations manager of the Drill division of Bucyrus-Erie

STOPPLE APPLICATION
HOT TAPPING
PIGGING
BUSHINGS & INSULATORS

Agent for T. D. Williamson, Inc.

MARKER VENTS
AERIAL MARKERS
WELL MARKERS
SAFETY SIGNS

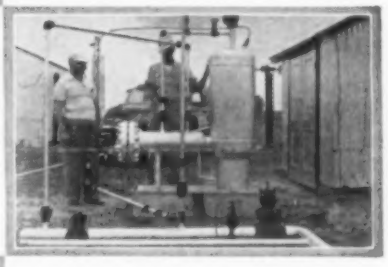
Sole Distributors for L & M Co.

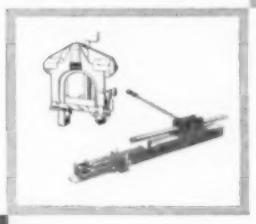
ASPHALT OUTERWRAP
ASPHALT COATING
ROCK SHIELD

Agent for Gulf States Asphalt Co.

H & H GAS ODORIZERS
Built to your specifications

Manufactured by Tod Pazdral





GUILLOTINE SAWS
NATIONAL SAWS

Agent for E. H. Wachs Co.

MERCURY HYDRAULIC
PIPE PUSHERS

Tell 'Em
We'll Be There!

You can depend on Topaz sales engineers to be on the job--on time--working in cooperation with your engineering department. Topaz service includes furnishing all equipment on a lease, contract or purchase basis. Call Topaz day or night . . . we'll be there!

TOD PAZDRAL — ToPaz
PIPELINE SPECIALTIES
2525 South Boulevard • Houston 6, Texas
Day Phone JA 2-1403 • Night Phone MA 3-5680

For more data on advertised products, use Readers' Service Cards, last page.

HOW WE WORK STEEL TO MAKE STEEL WORK FOR YOU

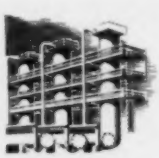
In the frozen north... Canada's first "BIG INCH"

WESTCOAST TRANSMISSION COMPANY is laying a 30 inch pipeline to tap the prolific gas resources of British Columbia and Alberta. This line runs from these fields due south to the international border. The 688-mile main line marks the first large-scale interchange of natural gas between western Canada's new and expanding fields and U. S. markets. A .O. Smith's Milwaukee mill supplied approximately 22% of the 30-in. pipe used on the project.

Northwest passage... new mileage for world's longest "crude line"

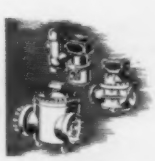
INTERPROVINCIAL PIPE LINE COMPANY has 1774 miles of main line now in service. They are extending this system another 156 miles during 1957. This big crude oil carrier extends from Edmonton, Alberta, to refineries in the Prairie Provinces and Ontario, in Minnesota, Wisconsin, and Michigan. Over 70% of the original line to Superior, Wisconsin, was supplied by A. O. Smith as well as most of the pipe for current and subsequent looping projects.

Want more facts about A. O. Smith products for the petroleum industry? Write today for free, illustrated brochure, "OIL"



Pressure vessels, heat exchangers

Glascote processing equipment



Gasoline dispensers, liquid meters

Today, as always . . .

there's A. O. Smith line pipe in major pipelines like these

Just about 30 years ago, A. O. Smith researchers developed the first truly practical method of mass-producing line pipe. *Result:* Pipelines, as we know them today, became economically feasible.

And A. O. Smith has kept the pace — with painstaking attention to quality in every production phase. This is the reason why A. O. Smith pipe, made and installed as far back as 1928, is still in operation today. This is the reason why you'll find A. O. Smith pipe in so many major high-pressure lines (including the four current projects pictured and described on these pages).

In the arid southwest... a river is pushed aside

To cross New Mexico's San Juan river, **EL PASO NATURAL GAS COMPANY** temporarily diverted the river . . . used dry-land pipelining methods. The new line will supply an additional 350,000,000 cubic feet daily to customers in California and 100,000,000 cubic feet more daily to customers in Arizona, New Mexico, Texas and Nevada. A. O. Smith Corporation of Texas mill supplied approximately 224 miles of 34-in. pipe for the project.

Underwater project..."MUSKRAT LINE" submarines toward completion

TENNESSEE GAS TRANSMISSION COMPANY'S 355-mile pipeline extension is laid underwater four-fifths of its length — traversing swamps and marshland. It will give the Tennessee gas system more than 9500 miles of line in 15 states, with average daily capacity of 1,800,000,000 cu. ft. A. O. Smith supplied the 18 and 20-inch pipe and a portion of the 24-in. pipe for the new extension.

Welding machines, electrodes and accessories

Line pipe, oil well casing

Through research A.O. Smith *. . . a better way*

A.O.Smith

CORPORATION

TUBULAR PRODUCTS DIVISION

Milwaukee 1, Wisconsin

International Division: Milwaukee 1, Wisconsin

CHICAGO 4
DALLAS 2
HOUSTON 2
LOS ANGELES 17
MIDLAND 5, TEXAS
NEW ORLEANS 12
NEW YORK 17
TULSA 3

For more data on advertised products, use Readers' Service Cards, last page.

Company. The company's Drill division will be located at Richmond where a new plant is now under construction. Completion is scheduled for late 1957 or early 1958.

Meuser comes to Bucyrus-Erie after serving as industrial relations manager of International Harvester Company's farm equipment plant since 1950.

American, English Companies Announce Recent Merger Agreement

De Laval Steam Turbine Company of Trenton, N. J., and John Holroyd & Co., Ltd., of Milnrow, Lancashire, England, have announced an agreement to pool their engineering and manufacturing resources. J. P. Stewart, president, De Laval Steam Turbine Co. and E. O. Liebert, chairman, John Holroyd & Co., Ltd. announced the formation of a new jointly owned company, De Laval-Holroyd Inc.

Cosasco Division was formed on June 5 last year when Perfect Circle Corporation of Hagerstown, Ind., acquired the company.

Jay P. Gould

D. M. Etter

COSASCO Now Operating At New Headquarters

Cosasco Division of Perfect Circle Corp., manufacturers of "Access" fittings has moved into new headquarters at 11655 McBean Drive, El Monte, Calif. The new telephone number is Gilbert 3-1394.

L. Auer

A need to expand production facilities to meet increased sales dictated the move, according to Jay P. Gould, general manager and founder of the predecessor company, Corona Oil Specialties and Service Co. A new location for the firm's export office, 3631 Atlantic Avenue, Long Beach, under Roland E. Smith, was also announced.

Key personnel of the Cosasco Division are Jay P. Gould, general manager of Cosasco and founder of the predecessor company, Corona Oil Specialties and Service Co.; D. M. Etter, sales manager and Leland Auer, manager of engineering.

Reilly Tar & Chemical Gets Eastern Sales Representative

Robert K. Morgan has joined Reilly Tar & Chemical Corporation as sales representative in the Eastern territory. He will work out of the company's Tuckahoe, N. Y., office.

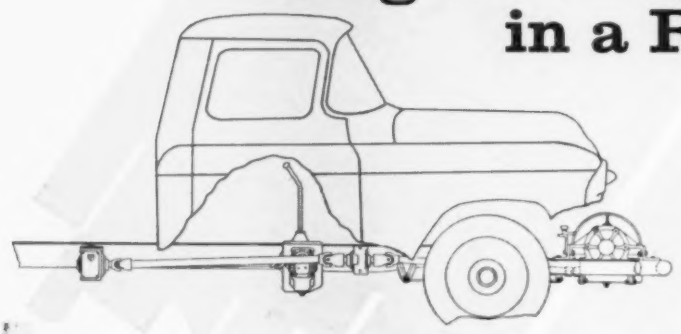
G. E. Welding Division Will Terminate Gradually

Plans for the gradual termination of the manufacture of all products by the General Electric Company's Welding department have been announced. It was emphasized that General Electric would continue to provide normal renewal parts and in-warranty service on all welding equipment now in the field or to be produced before termination of the business.

Products to be discontinued include arc welding equipment and electrodes. This does not affect the manufacture of resistance welding control.

BRADEN TRUCK WINCHES

Snug as a Bug in a Rug



There is a BRADEN front-end winch designed to fit any make and model of truck. Notice in the installation drawing how snug the winch fits into place. Every dimension is carefully calculated to assure proper fit without crowding. Simple instructions make it possible to install winch with the minimum of time and effort.

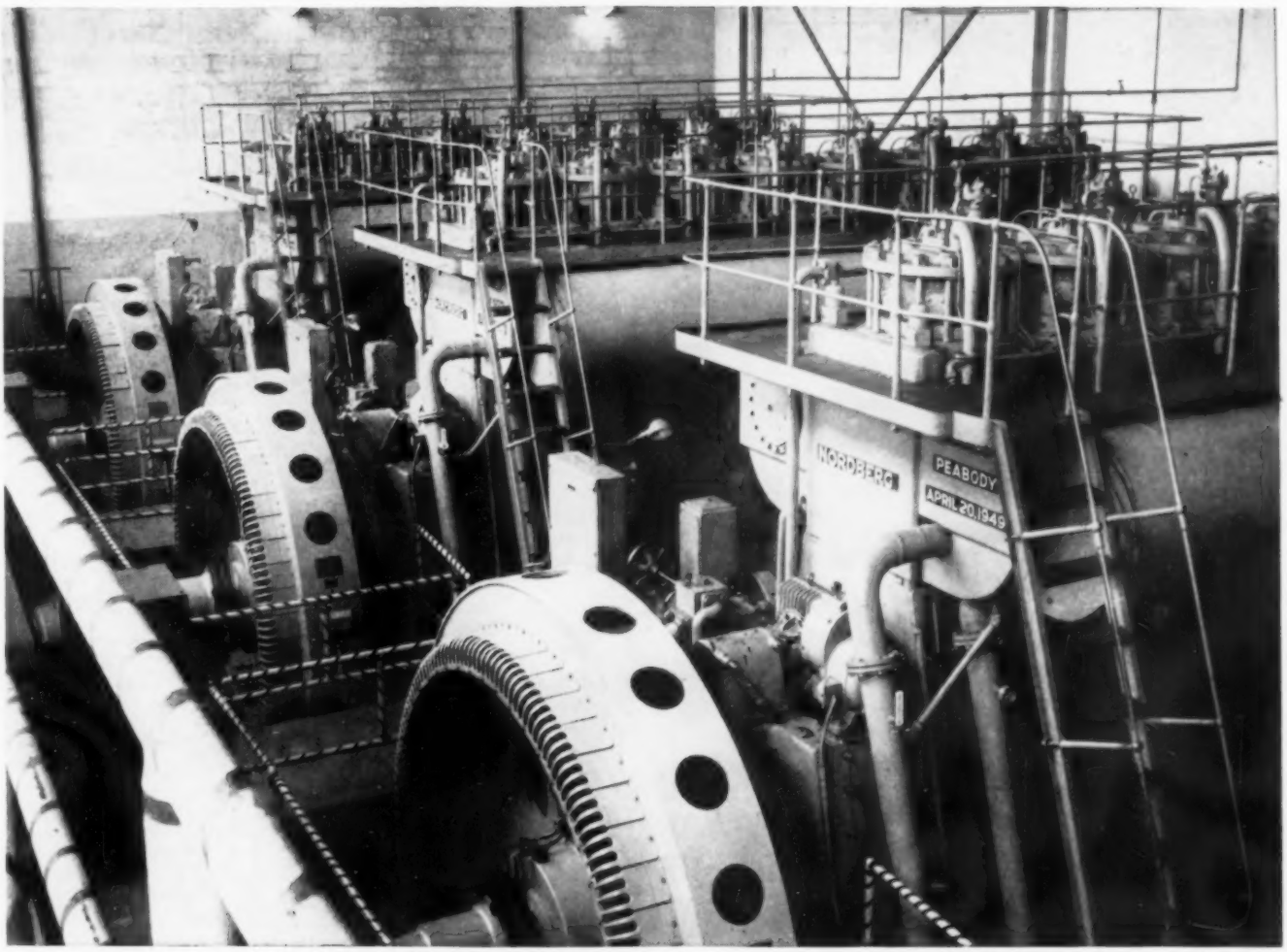
BRADEN Truck Winches are made in capacities from 6,000 to 100,000 pounds. Specify BRADEN Winches . . . and be sure!

WRITE FOR CATALOG

BRADEN WINCH COMPANY
P. O. Box 547, Broken Arrow, Oklahoma

BRADEN Winches
In service around the world

Look to **COOK** for Better Rings!

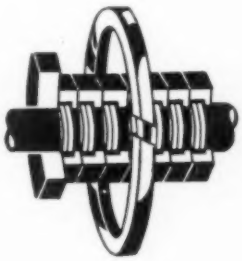


Peabody, Mass. Electric Company Swears by Cook Piston Rings!

Better Performance Since Installation of Cook Rings!

All three of Peabody Electric Company's 3200 H.P. Diesel engines are shown here. In 1956 these engines were required to operate 11,375 hours and generated 19,609,100 kilowatt hours. All three were equipped with Cook Piston Rings and gave trouble-free performance throughout the year.

This record is a tribute to Peabody's excellent management and operating personnel — *and* to the outstanding quality of Cook Piston Rings. If you're looking for a seal with the savings built in, write direct for product information and the name of your nearest representative. Address: C. Lee Cook Company, 944 South 8th Street, Louisville 3, Kentucky.

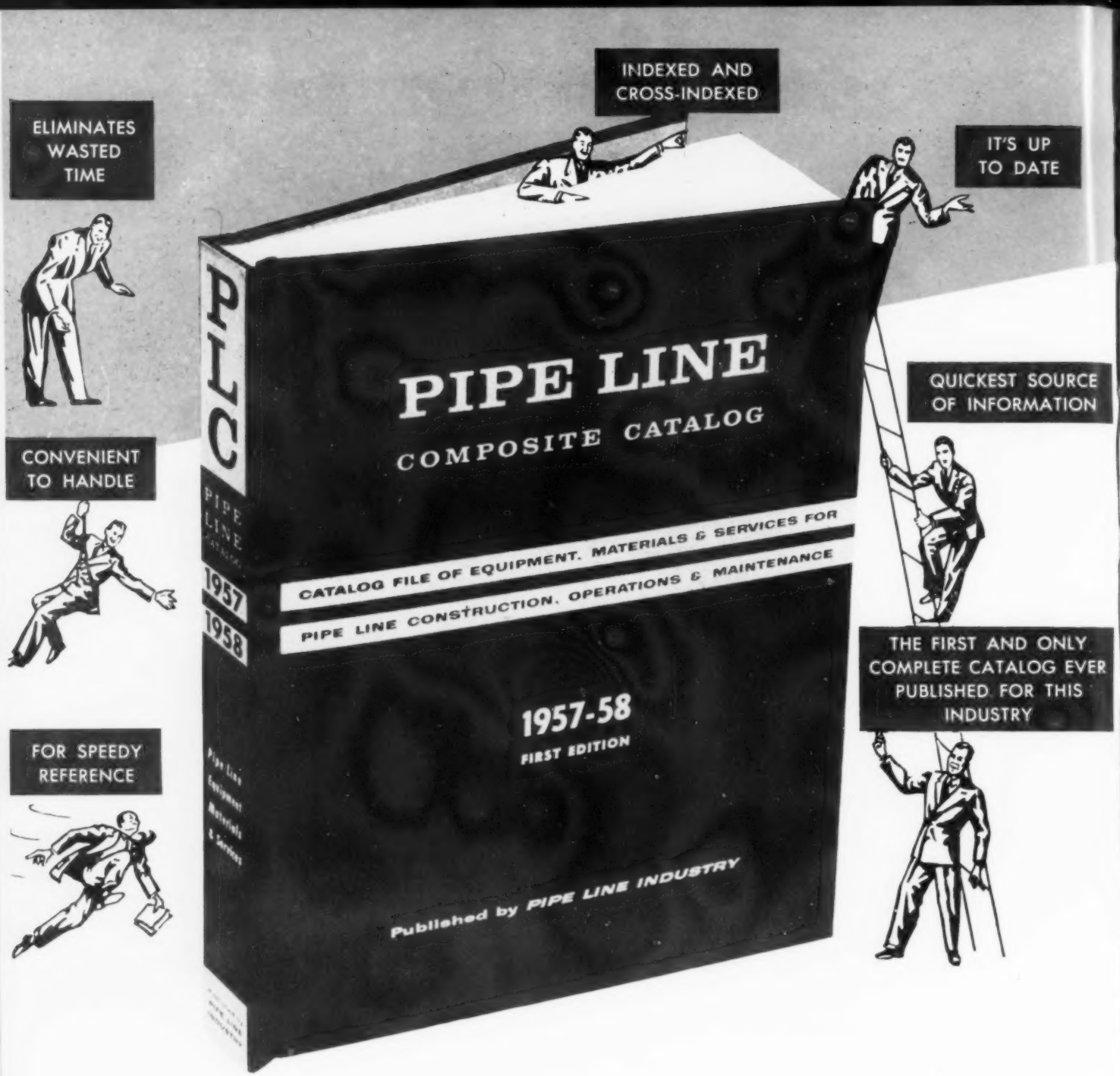


C. LEE COOK COMPANY

Division of Dover Corporation

Rings and Packings Since 1888

For more data on advertised products, use Readers' Service Cards, last page.



The first catalog data file ever published especially for the Pipe Line Business is now off the press. It is serving as a genuine time saver for operating and field executives, superintendents, foremen, engineers, purchasing agents and many others who buy or specify equipment and materials.

Almost 150 leading companies have filed their complete or condensed catalogs in this useful first edition. Compiled by the manufacturers themselves, this information is arranged and indexed to offer a quick and convenient means of locating *what you want when you want it.*

If furnished to you in individual brochures, bulletins or specification sheets, the information that is now condensed into this composite catalog file would fill the equivalent of several file drawers or book shelves.

On the opposite page you'll find a complete list of the companies that have filed data in the new, specialized PIPE LINE COMPOSITE CATALOG. When you are looking for sales information, be sure to check these companies in your PIPE LINE COMPOSITE CATALOG. It is the most complete source of buying information available in one volume for this industry today.

ACF Industries, W-K-M Division
The Aerotec Corp.
M. N. Aitken Co.
Alco Products, Inc.
Aldrich Pump Co.
Allied Chemical & Dye Corp., Barrett Division
Allis-Chalmers
Alston Manufacturing Co.
American Blower Division of American-Standard
American Cyanamid Co., Jefferson Chemical Co. Subsidiary
Anchor-Wate
Automatic Power Inc.

Barber-Greene Co.
Barrett Division, Allied Chemical & Dye Corp.
J. B. Beaird Co., Inc.
Berry Hydraulics, Oliver Tyrone Corp.
Bethlehem Supply Co.
Bettis Corp.
Books for Pipe Line Industry
Borg-Warner Corp., Byron Jackson Div.
Bramble Industries, Gulf States Asphalt Co. Division
Bucyrus-Erie Co.
Buffalo-Eclipse Corp., Penberthy Manufacturing Co. Division
G. T. Bynum Co.
Byron Jackson Pumps, Inc., Subsidiary of Borg-Warner Corp.

E. L. Caldwell Co.
Philip Carey Mfg. Co.
Caterpillar Tractor Co.
Cathodic Protection Service
Central Plastics Co.
Clark Bros. Co., One of The Dresser Industries
Coffing Hoist Division, Duff-Norton Co.
Colorado Fuel and Iron Corp., Wickwire Rope Division
Commercial Iron Works
Cook Bros. Equipment Co.
C. Lee Cook Co., Division of Dover Corp.
Corrosion Rectifying Co., Inc.
G. A. Cotten Co.
M. J. Crose Manufacturing Co., Inc.
Crutcher-Rolfs-Cummings, Inc.

Darling Valve & Manufacturing Co.
John Deere—Industrial Division
Dover Corp., C. Lee Cook Co. Division
Dresser Industries, Clark Bros. Co. Division
Magnet Cove Barium Corp. Division
Drive-Thru Gate Co.
Duff-Norton Co., Coffing Hoist Division
Dutch Brand Division, Johns-Manville Corp.

Allan Edwards, Inc.
Elliott Co., Ridgway Division
Embart Manufacturing Co., The Maxim Silencer Co. Subsidiary
Engineering Research Corp.

Falk Corp.
Farrel-Birmingham Co., Inc.
Federal Telephone and Radio Co., Division of International Telephone and Telegraph Corp.
Fish Engineering Corp.
Flexitallic Gasket Co.
Fluor Products Co., Division of Fluor Corp., Ltd.

Gardner-Denver Co.
Gaso Pump & Burner Mfg. Co.
Gearench Mfg. Co.

These leading manufacturers, suppliers and service companies have filed complete or condensed catalog data in the first (1957) edition of the new PIPE LINE COMPOSITE CATALOG. See their detailed information in the catalog when you are ready to buy.

General Electric Co.
The Gorman-Rupp Co.
Granberg Corp.
Greenhead Sling and Supply Co.
Greenwood Valve Division, Vernon Tool Co., Ltd.
Grove Valve and Regulator Co.
The Gulf Publishing Co. (Pipe Line Forms)
Gulf States Asphalt Co., Division of Bramble Industries

H & L Tooth Co.
H & M Pipe Beveling Machine Co.
Hamer Valves Inc.
Hammond Iron Works
Haynes Manufacturing Co.
Hercules Motors Corp.
Holcombe Co., Inc.
Homelite, Division of Textron Inc.
Houston Equipment Co., Inc., Division of Houston Foundry & Machine Co.
Hudson Engineering Corp.
Humble Oil & Refining Co.
Hydril Co.

Ingersoll-Rand Co.
International Telephone and Telegraph Corp., Federal Telephone and Radio Co. Division

Jefferson Chemical Co., Subsidiary of American Cyanamid Co.
Johns-Manville Corp., Dutch Brand Div.

King Tool Co., Ltd.
Kinzbach Tool Co., Inc.

L & M Company
L-K Pump Valve Co.
Ledeen Mfg. Co.
LeRoi Division, Westinghouse Air Brake Co.
Lloyd Metal Foundry
Lubrikup Co., Inc.
Lufkin Foundry & Machine Co.

Magnet Cove Barium Corp., One of the Dresser Industries
Magnetrol Inc.
S. N. M. A. R. E. P.
Marsh Instrument Co.
Mason-Neilan Division of Worthington Corp.
C. A. Mathey Machine Works, Inc.
Mavor-Kelly Co.
Maxim Silencer Co., Subsidiary of Embart Manufacturing Co.
McFarland Engineering & Pump Co.
McFarland Manufacturing Corp.
McKissick Products Corp.
Mercoid Corp.
Midwestern Pipe Line Products Co.
Mine Safety Appliances Co.
Mixing Equipment Co., Inc.
Modern Motors Sales & Service
Morris-Young-Owens Co.
Mountain States Asphalt Co., Division of Bramble Industries

Multiple Corp.
Frank W. Murphy, Manufacturer, Inc.

National Cylinder Gas Co., Tube Turns Division
National Tank Co.
Naylor Pipe Co.
Nickles Machine Corp.

Oliver Tyrone Corp., Berry Hydraulics
Oil Well Supply Division, United States Steel Corp.

Panellit, Inc.
Peerless Manufacturing Co.
Pelican Supply Co., Inc.
Penberthy Manufacturing Co., Division of Buffalo-Eclipse Corp.
Perrault Equipment Co.
Petrolite Corp., Tretolite Co. Division
Pipe Line Development Co.
Pipelife Corp.
Pittsburgh-Des Moines Steel Co.
Plyon QX, Modern Motors Sales & Service
Porter Co.
Potter Aeronautical Corp.
Protecto Wrap Co.
Pye Telecommunications Ltd.

Quality Marsh Equipment Co., Inc.

Ramsey Winch Manufacturing Co.
Reilly Tar & Chemical Corp.
Remco Manufacturing Co.
Ridgway Division, Elliott Co.
Rochester Manufacturing Co., Inc.

Schramm, Inc.
SHMCO Valves Inc.
M. B. Skinner Co.
Snelling Manufacturing, Inc.
Southern Mill & Manufacturing Co.
Sprague Engineering Corp.
Staytite Co.
D. E. Stearns Co.
N. C. Stearns Co.
Steel Forgings, Inc.
Superior Equipment Co.

Taylor Instrument Companies
Textron Inc., Homelite Division
Thermix Corp.
Thornhill-Craver Co., Inc.
Tinker & Rasor
Tretolite Co., Division of Petrolite Corp.
John D. Trilsch Inc.
Tube Turns, Division of National Cylinder Gas Co.

United States Motors Corp.
United States Steel Corp., Oil Well Supply Division

Vernon Tool Co., Ltd., Greenwood Valve Division
J. H. H. Voss Co., Inc.

W-K-M Division of ACF Industries, Inc.
E. H. Wachs Co.
John Waldron Corp.
Waukesha Motor Co.
Westinghouse Air Brake Co., LeRoi Division
Frank Wheatley Pump & Valve Mfr.
White Diesel Engine Division, The White Motor Co.
Whitmor Homebuilders, Inc.
Wickwire Rope Division, The Colorado Fuel and Iron Corp.
Wilkinson Products Co.
Worthington Corp.
Worthington Corp., Mason-Neilan Division

Yale Machine Works

PIPE LINE COMPOSITE CATALOG

Published by PIPE LINE INDUSTRY

P. O. BOX 2608 **HOUSTON, TEXAS**

What's New in EQUIPMENT

Cleaning and Wrapping

The development of a dual-purpose line travel cleaning and wrapping machine has been announced by Crutcher-Rolfs-Cummings, Inc.

The machine consists of a standard CRC cleaning and priming machine with the priming attachment removed. In its place a wrapping head assembly is universally mounted to the cleaning machine frame. Because of its pivoted attachment, the wrapping head is always perpendicular to the pipe, even on the sharpest bends. Thus, the lap being applied is always constant. A patented variable drive design is used in getting a fine adjustment of the lap.

Combination cleaning and wrapping by a single unit eliminates the use of extra pipe cradles, side booms and labor, thereby reducing costs.

The CRC cleaning and wrapping machine can be built to accomodate all pipe sizes, and the wrapping head can be fitted with a two or four-arm set up.

(This item supplements Crutchers-Rolfs-Cummings, Inc. data on Pages 107-110 of the Pipe Line Composite Catalog, 1st Edition.)

For more data, circle **No. E1** on Readers' Service Card, last page this issue.

Straddle Carrier

The new British made "Steelmaster" Straddle Carrier, combining the normal duties of a straddle carrier and a mobile crane, features a hydraulic crane with 180 degree swing, extendable arm from five feet, six inches up to 15 feet, nine inches.

Operated by one man, the unit can load or unload in a matter of seconds. With speeds up to 30 miles an hour it provides rapid and efficient transport between two points. Its capacity is five tons, and it will take a one in seven gradient fully loaded. For pipe-laying, pipe transported to the site by the carrier can be removed individually by the crane and lowered directly into the trench if required. Unit is available with either gasoline or diesel engine power.

For more data, circle **No. E2** on Readers' Service Card, last page this issue.

Continuous Cable Clamp

A new fitting available from Sauerman Bros. provides a quick way of attaching a load to a continuous cable. The clamp is being used for car pulling, barge moving, rigging or any job where a load must be connected to a line.

The three-part fitting consists of a wedge clamp, wedge and cable clip. To attach the load to the cable, the wedge clamp is placed on the cable with the small end in the direction of the cable pull. The wedge is then inserted. The

cable clip passes through the eye of the wedge and locks it in place. A clevis and pin are frequently used to attach the load to the clamp.

For more data, circle **No. E3** on Readers' Service Card, last page this issue.

Expansion Joints

A line of improved corrugated expansion joints in which movement of power and process piping systems is shared equally by all corrugations is available from Zallea Brothers.

Called Zallea Duo Equalizing expansion joints, these units are used in all-weather outdoor piping systems and for indoor systems operating on frequent on and off cycles to protect piping and related equipment against damage due to temperature change.

Equal distribution of pipe expansion and contraction to all of the corrugations is accomplished by pantographs. The pantograph neutrals are anchored to the unit's end fittings and intermediate equalizing rings. Any end fitting movement is immediately transferred by the pantograph to all equalizing rings. This moves all rings the same distance at the same time to give uniform use of all corrugations and prevent undue stress to any one corrugation.

These new expansion joints feature four design improvements including 40 percent longer life than self equalizing expansion joints at the same pressure and movement, 30 percent less over-all length, 30 percent less weight and greater stability at high pressures because of the reduced ratio of length to diameter.

Zallea Duo Equalizing expansion joints are made from stainless steel in sizes from 3-inch dia to 72-inch dia and for traverses up to 7½ inches in a single or 15 inches in a double unit. Standard units are designed for 150 and 300 psi working pressures but can be made for higher pressures on special request. Zallea also makes this style unit from copper for use with copper or brass piping. Copper Duo Equalizing expansion joints are available

from 3 inches to 24 inches diameter in both single and double units. The maximum operating pressure for copper expansion joints is 125 psi at 406° F.

For more data, circle **No. E4** on Readers' Service Card, last page this issue.

Quick Couplings

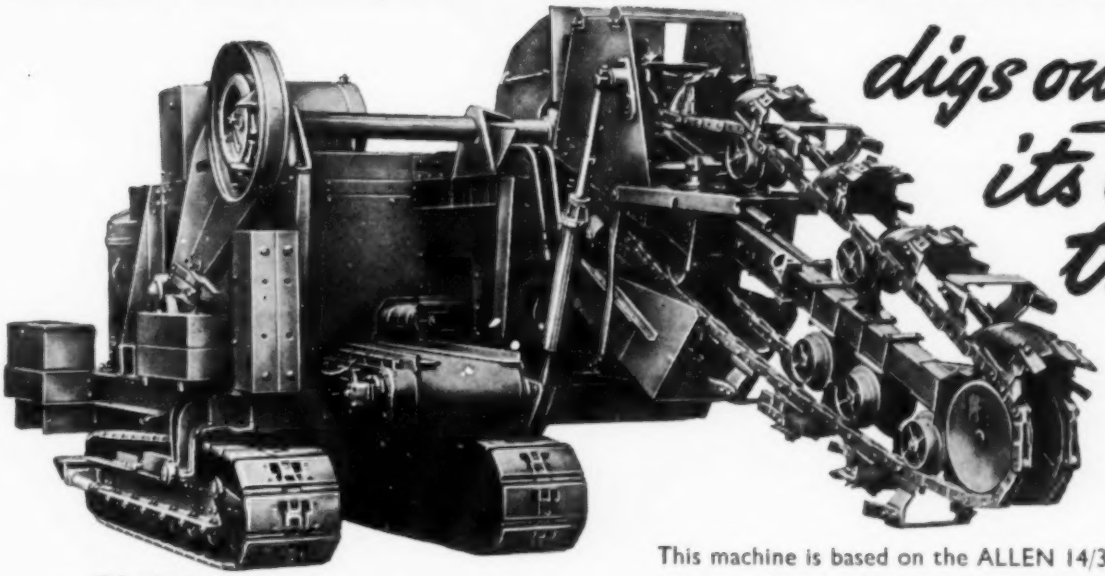
Featuring a new slotted lever for seals used in transporting aircraft gasoline or other special fluids, a complete line of quick couplings is being introduced by the Central Machine and Tool Company. Under the trade name, Lever-Seal, the new series will include all types and pipe size ranges from 1¼-inch through 4-inch.

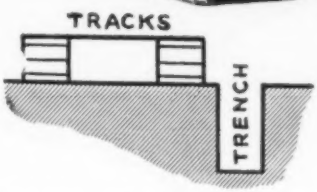
Couplings are of improved heavier design, cast in a selection of high quality materials by the automatic shell molding process. All parts are interchangeable with those of major manufacturers.

For more data, circle **No. E5** on Readers' Service Card, last page this issue.

The ALLEN *OFFSET* TRENCHER

digs outside its own tracks





This diagram shows the position of the trench in relation to the tracks. The middle of the trench is 49 inches from the centre line of the machine.

This machine is based on the ALLEN 14/30, but the digging boom is offset to the right. With this arrangement trenches can be dug very close to obstructions, and in positions where no other trencher could be used.

With a side mounted boom there is considerable lateral stress when working. To withstand this the frame is constructed of massive steel channels, and the drive shaft mounted in a heavy tubular support. Trench widths range from 12-in. to 21-in. Maximum digging depth is 4-ft. 6-in.

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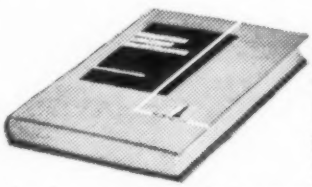
How COMPUTERS are solving problems in the sciences, engineering, and business



Gives a clear idea of new and powerful tools for solving technological problems. Computing devices and their components are described, especially the automatic digital computer, the way it works, its capabilities and limitations. How analog or "continuous" computers are used for obtaining quantitative data is also pointed out.

MATHEMATICS AND COMPUTERS

By *G. E. Stibitz*, Consultant, and *J. A. Larrivee*, Worcester Polytechnic Institute, *225 pp., 6 x 9, 49 illus., $5.00*

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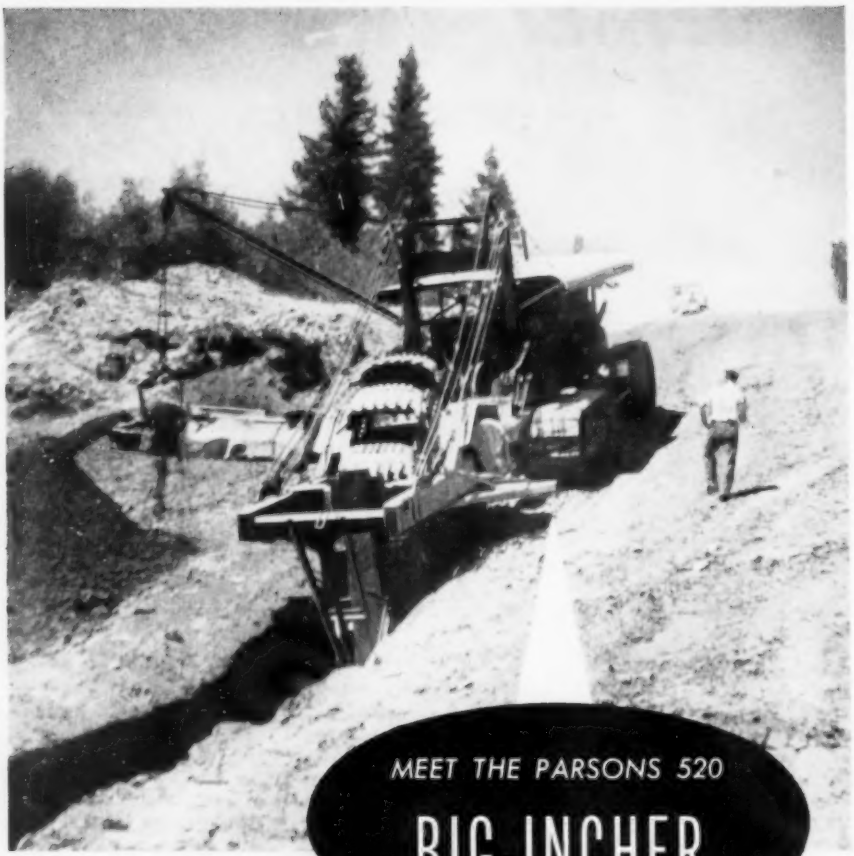

MEET THE PARSONS 520

BIG-INCHER

New 170 wide-wheel Trenchliner digs 20 to 32 inches wide, 5¾ feet deep. It has hydraulic wheel-hoist on power-tilt mast. Conveyor is hydraulically driven — belt speeds are independent of digging wheel speeds. Big Parsons line includes all sizes — wheel-types, ladder-types — on crawlers, and on rubber tires.

Big things have happened since you last bought a big cross-country ditcher! Look at the new sizes recently added to the line of *Trenchliners for pipeliners.* Parsons now brings you a Big-Inch wheel-type 520, with digging speeds up to 28 feet per minute — widths from 40 to 52 inches, depths to 8½ feet. And that's not all —

Also, a MIDDLE-INCHER

Another big-wheel Trenchliner has joined the Parsons line — a Middle-Inch 420, which opens up to 44 lineal feet of trench per minute. It digs 31 to 46 inches wide, at depths to 7½ feet.

Both of these big, heavy-duty machines have been thoroughly *jobproved.* They were formerly built by C-R-C, and now manufactured by Parsons — bringing you the combined engineering experience and services of both firms. Want all the facts? Send for literature today.

PARSONS COMPANY, DIVISION OF KOEHRING
NEWTON, IOWA

Mail to: PARSONS COMPANY, Newton, Iowa
Send us specs. on: ☐ 520 ☐ 420 ☐ 170

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TRENCHLINERS® for PIPELINERS

Tank Gauge

The Oceco Division of The Johnston & Jennings Co. has introduced its new No. 30 Tank Gauge. The company reports these gauges have proven a high accuracy during tests conducted in conformance with A.P.I. gauging committee standards and on tanks under actual service conditions. The gauges can be inspected and checked easily and quickly, are readily adapted to remote reading and can be installed on new tanks or tanks already in service.

Friction or drag which tends to impair gauging accuracy is reduced to a minimum. All shafts, including those in the gauge housing and sheaves, are stainless steel supported on rulon bearings.

For more data, circle **No. E6** on Readers' Service Card, last page this issue.

New NEMA Standards

All General Electric Size 0 and 1 magnetic contactors and motor starters in across-the-line, non-reversing, combination and reversing forms meet the new NEMA standards for motor starters, the company's General Purpose Control Department has announced.

Size 0 starters are now rated up to 5-horsepower at 440/600-volts and Size 1 starters are rated for 10-horsepower at 440/600 volts. Lower cost and smaller size are two advantages that can be obtained from the re-ratings. A Size 1 starter can now be used on some applications that formerly required a Size 2. In many cases, a Size 0 unit can now be used instead of a Size 1.

The company's new "100 Line" Size 0 and 1 magnetic contactors and starters are built to meet the new NEMA ratings.

(This item supplements General Electric Co. data on Pages 181-188 of the Pipe Line Composite Catalog, 1st Edition.)

For more data, circle **No. E7** on Readers' Service Card, last page this issue.

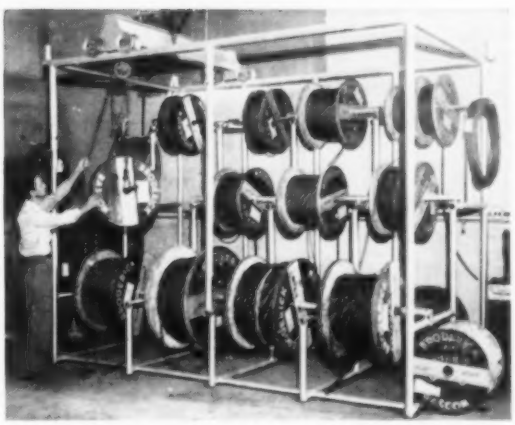
Yellow Strand... always on hand

Reels Ready to Roll When You Need Wire Rope

Stocks on hand . . . that's good to know when you need wire rope. It assures steady production on your equipment when time counts most.

There are always adequate stocks of Yellow Strand Wire Rope in the right types and sizes — conveniently near you. Yellow Strand distributors and Broderick & Bascom Warehouses are strategically located throughout the U.S.A., always ready to serve you.

High quality Yellow Strand Wire Rope, resulting from more than 80 years manufacturing experience, means long wire rope life and lower costs. Take advantage of the extra service you get from Yellow Strand — and the money-saving feature of "stocks on hand." Write for name of nearest distributor.



This is typical of many Yellow Strand distributor wire rope stocks. You have it when you need it — at nearby stores or warehouses. Experienced counsel on wire rope application is also available at your distributors or from a Broderick & Bascom sales engineer. Ask for it today.

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Manufacturers of Wire Rope for over 80 Years

BRODERICK & BASCOM ROPE CO.

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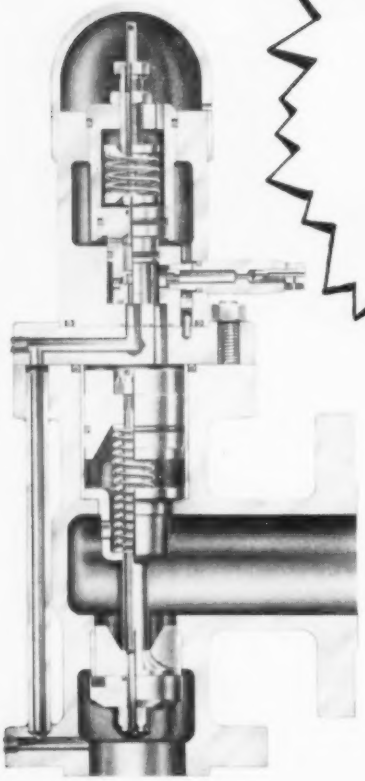

INSTANTANEOUS OPENING FOR GAS OVERPRESSURES

MODEL 416 RELIEF VALVE ASSURES POSITIVE PROTECTION

The new pilot operated Kinzbach Model 416 Relief Valves were designed to be the most dependable relief valve for gas services. Whenever line pressure reaches set pressure the pilot valve opens and full line pressure is applied to the main valve, opening it through its full stroke without pressure accumulation.

This flat-seated pilot valve has a stainless steel loading spring which makes possible an extremely accurate set pressure and years of trouble-free performance. Some other advantages of this simple and rugged valve include its positive leakproof seating, easy functional testing below set pressure, and convenient bench setting for both opening and closing pressure. The Model 416 Valves are Certified under A.S.M.E. Unfired Pressure Vessel Code (Sec. VIII, Par. UG-131).

For complete details on this and other Kinzbach Relief Valves, write for new catalog.

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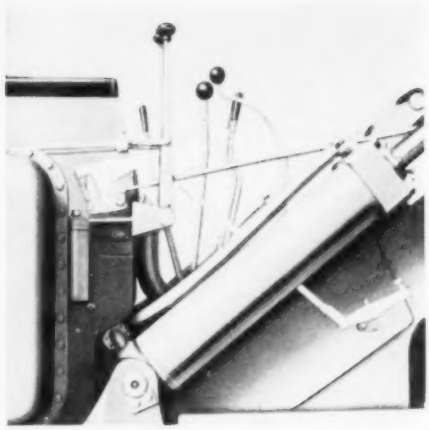


Bucket Positioners

Automatic bucket positioners for the No. 955 and No. 933 Traxcavators have been announced by Caterpillar Tractor Co.

The bucket positioning feature, long a standard on the Cat No. 977 Traxcavator, automatically moves the bucket tilt control lever from the tilt-back position to the hold position when the bucket reaches a preset digging angle.

The adjustable linkage provided with the bucket positioner allows the bucket to be positioned at any point between an approximate five-degree digging angle and a three-degree tilt-back angle. For No. 955 and No. 933 Traxcavators already in operation, field change-over kits are available.

(This item supplements Caterpillar Tractor Co. data on Pages 67-69 of the Pipe Line Composite Catalog, 1st Edition.)

For more data, circle **No. E8** on Readers' Service Card, last page this issue.

Valve Seat Arrangement

A new valve-seating arrangement, employing teflon, that achieves a double seal in valves handling petroleum products ranging from the heaviest viscous fluids to the lightest gases at pressures up to 5000 pounds per square inch has been introduced by W-K-M division of ACF Industries, Inc.

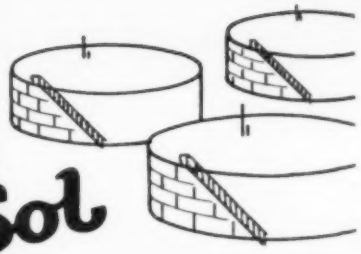
A specially designed teflon seat insert makes possible the "double-tight seal," which is said to double the sealing efficiency of the Houston company's valves. The first seal occurs when the expanding gate and segment faces of the valve contact the teflon insert. The second seal is made by the gate and segment faces against the metal seat. Together, the teflon and metal seal ring are said to provide a double-tight seal, both upstream and downstream.

The self-lubricating teflon insert provides a slickly smooth surface for the gate and segment to glide across. It compresses when the gate and segment expand in the open or closed position. The teflon insert will not flow; it is immune to acids, alkalis and petroleum fractions, W-K-M engineers say. Also, they point out, it will not vulcanize and never requires lubrication.

The teflon inserts are now standard on all oil field valves through four inches, rated up to 5000 pounds per square inch, and are available for larger size valves. Seats with teflon inserts can also be installed in W-K-M valves now in service.

For more data, circle **No. E9** on Readers' Service Card, last page this issue.

RECLAIM TANK BOTTOMS with BrakeSol



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PARAFFIN

The money you make on reclaimed tank bottoms by using BRAKESOL will be substantially more than the cost of treating . . . including chemical and labor. Safe for use in production, pipeline and refinery equipment . . . Contains no chlorides, sulphides or other halides. BRAKESOL Treating Engineers have the experience and know-how to do a successful job. Contact them now!

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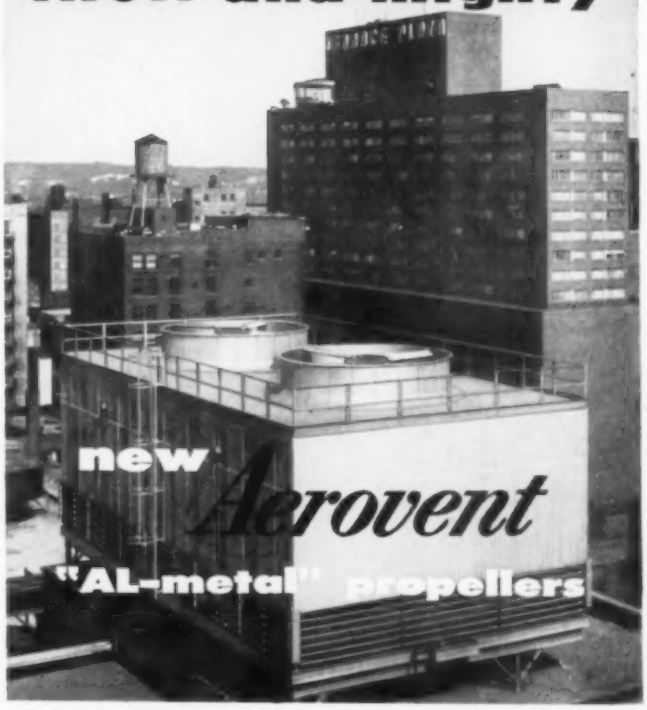
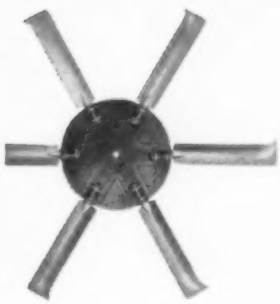


move mountains - of AIR!
in towers and exchangers



- Sizes 14' to 18'
- 4 or 6 blades

Developed originally for the petroleum industry, Aerovent Large-Diameter "Al-metal" Propellers, constructed of tough, durable aluminum alloy, move great quantities of air at high velocities, in heat exchangers and cooling towers. Pictured above are two 4-blade, 16-ft. propellers in a cooling tower installation. These mighty propellers, with adjustable-pitch "Macheta" Airfoil blades, are job-engineered to individual specifications.

Write for free Bulletin 510

DESIGNED FOR DEPENDABLE OPERATION!

Endurance tests, conducted at *3 times* normal loading prove the ability of these new large-diameter propellers to withstand severe punishment. Heavy-duty cast steel hubs offer maximum resistance to stresses. Angle settings for each operating requirement, and appropriate alternate settings, assure accurate pitch for any predetermined performance which may be required. 54" to 144" now available in revolutionary new "T-Alloy".

REFINERIES, pumping stations, industrial plants and commercial buildings use Aerovent "Al-metal" Propellers in major air-moving applications.

Aerovent FAN COMPANY, INC.
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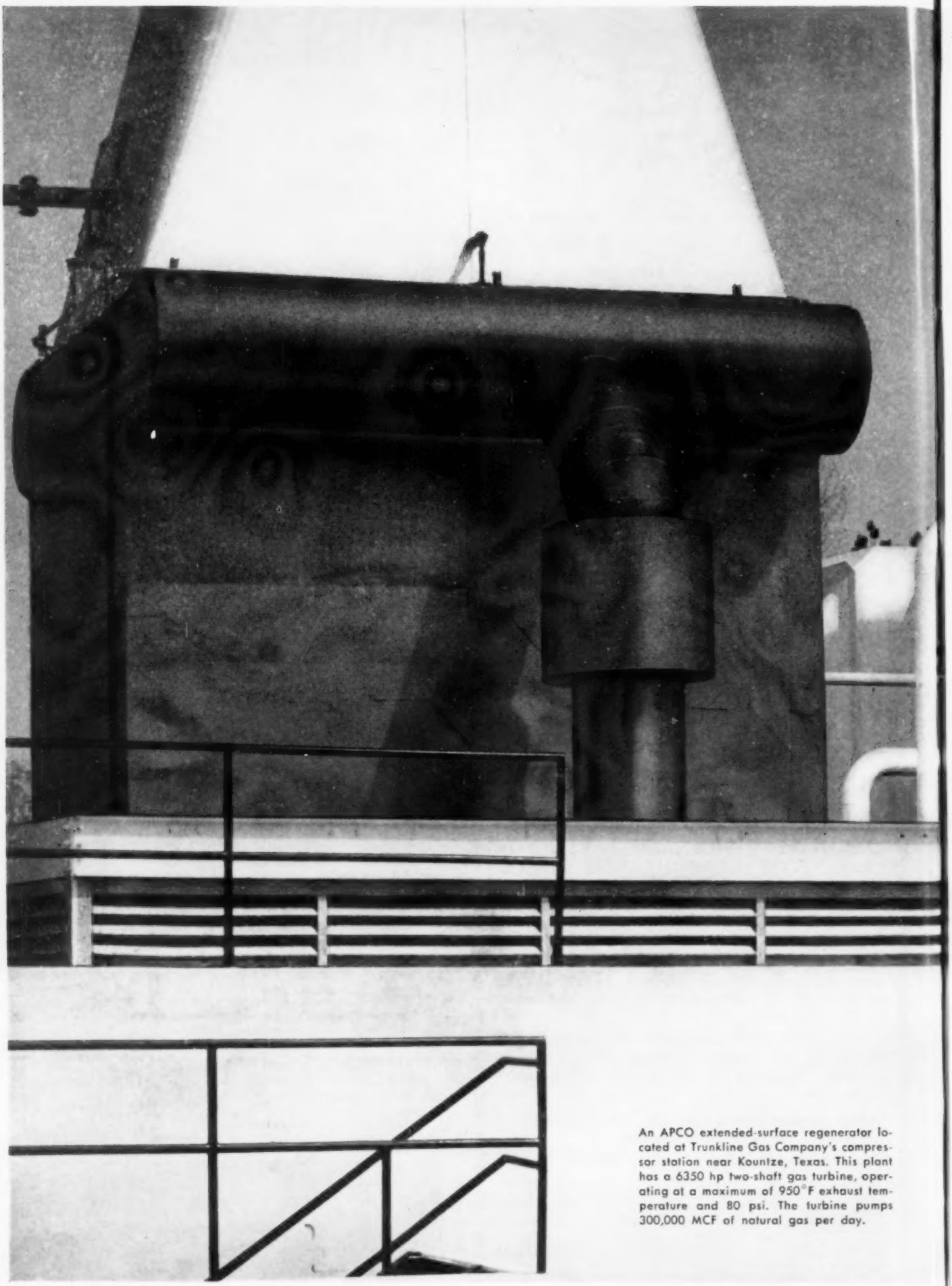
For more data on advertised products, use Readers' Service Cards, last page.



An APCO extended-surface regenerator located at Trunkline Gas Company's compressor station near Kountze, Texas. This plant has a 6350 hp two-shaft gas turbine, operating at a maximum of 950°F exhaust temperature and 80 psi. The turbine pumps 300,000 MCF of natural gas per day.

with pipeline costs soaring...

HOW MUCH CAN APCO REGENERATOR EQUIPPED GAS TURBINES CUT STATION MANPOWER?

A gas turbine equipped with a heat exchanger can cut man-power as much as 80% . . . compared to diesel, steam turbine, or gas-engine requirements. Only 7 to 9 men, on the average, are needed to maintain a gas turbine station.

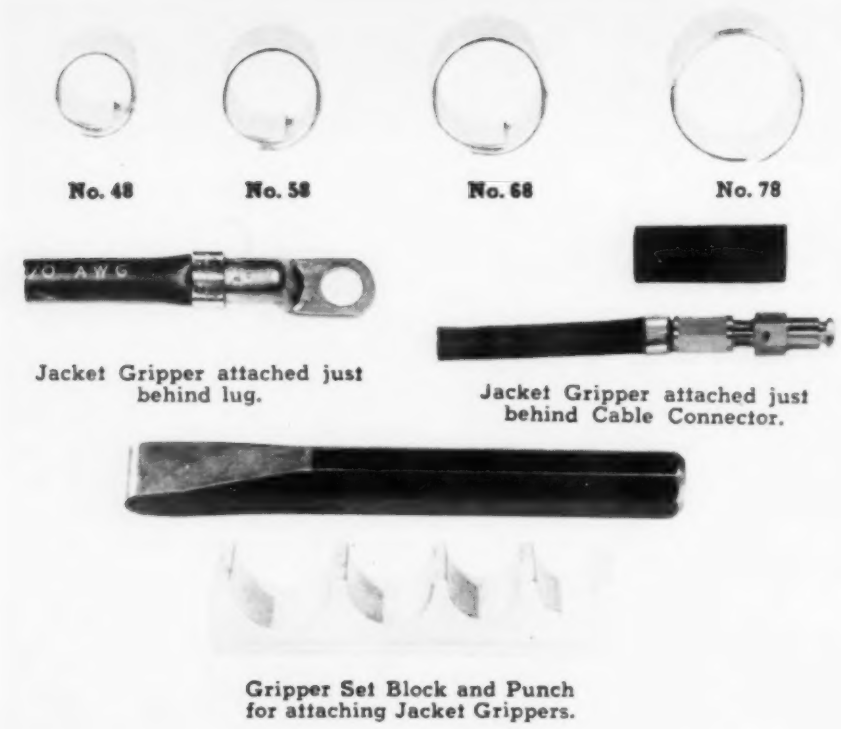
And when the heat exchanger is ar APCO extended-surface regenerator, you get these extra advantages:

- The volume occupied is less than half of that required for other regenerators.
- The weight is half that of other regenerators.
- Less than 500 manhours are required for erection of a unit on a 5000 hp cycle.
- No maintenance is required.

In terms of thermal efficiency, an APCO regenerator with 75% effectiveness can increase a gas turbine cycle operating at a 6-1 pressure ratio and 1500°F *as much as 7.5% absolute.* This is 32% over a cycle with no regeneration! And represents a fuel saving of about 30%. In other words, it saves 30% of the heat contained in the turbine exhaust heat, which would otherwise be expelled to the atmosphere.

Be sure to investigate the advantage of an APCO extended-surface regenerator, if you are considering gas turbines. For details of their labor saving efficiency, write Air Preheater Corporation . . . better yet, call and arrange for our engineers to sit down with yours.

The Air Preheater Corporation 60 East 42nd Street, New York 17, N. Y.


No. 48
No. 58
No. 68
No. 78
Jacket Gripper attached just behind lug.
Jacket Gripper attached just behind Cable Connector.
Gripper Set Block and Punch for attaching Jacket Grippers.

Jacket Grippers

Tweco "Jacket-Grippers" have been introduced by Tweco Products, Inc. The "Jacket-Grippers" are lapped end steel bands which, when installed around the rubber jacket of a welding cable, internally bind the cable strands and cable jacket into a strong composite section. They can be used anywhere in the welding circuit.

They are made in four sizes to cover the full range of welding cable and are attached with the Tweco "Gripper-Set" Saddle Block and Indention Punch.

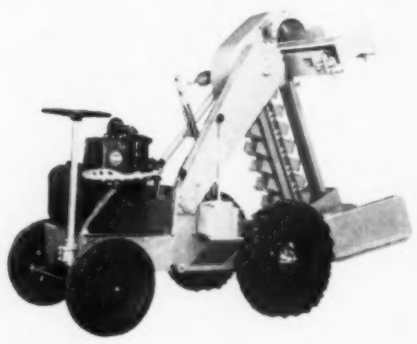
For more data, circle **No. E10** on Readers' Service Card, last page this issue.

Ditch-Witch Trencher

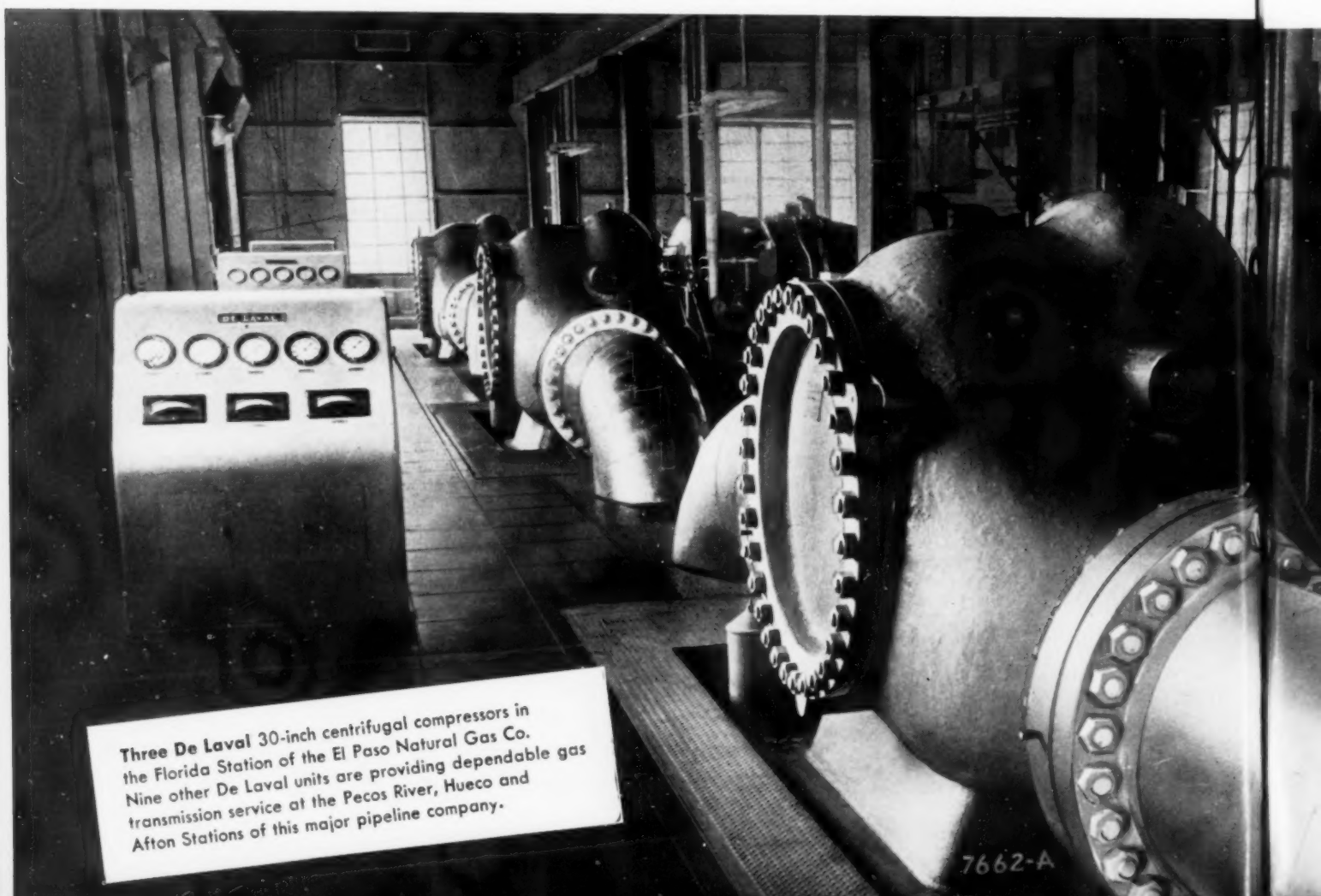
The new model LD Ditch-Witch trencher designed to provide the contractor, utility company and municipality with a low cost yet high performance trencher for service lines and footings has been announced by the Charles Machine Works.

The Model LD is completely mobile with trenching speeds up to eight fpm and road speed up to 5 mph. Standard trench widths are available from 4 inches to 16 inches at two-inch intervals. The machine will dig a four-inch or six-inch trench to a depth of 42 inches. Approximately six inches less depth is obtainable for each additional two-inch width of trench.

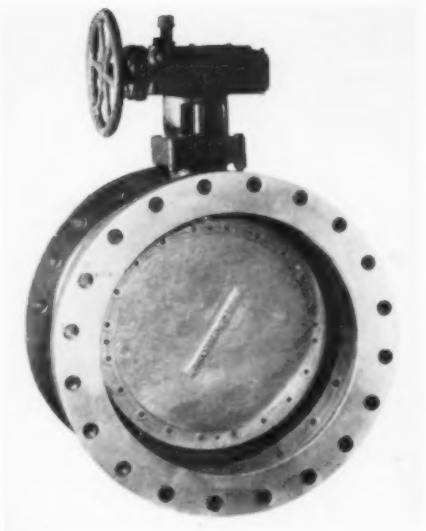
Features of the Model LD Ditch-Witch are 18 horsepower Wisconsin air cooled engine, automotive transmission with three speeds forward and reverse, reversible spoils conveyor, double activating hydraulic pump for raising bucket line and 15-inch drive wheels for increased traction.



For more data, circle **No. E11** on Readers' Service Card, last page this issue.



Three De Laval 30-inch centrifugal compressors in the Florida Station of the El Paso Natural Gas Co. Nine other De Laval units are providing dependable gas transmission service at the Pecos River, Hueco and Afton Stations of this major pipeline company.



Butterfly Valve

The production and immediate availability of a new line of butterfly valves, featuring a unique rubber seating principle and unusual operating characteristics, has been announced by Darling Valve & Manufacturing Company.

Manufactured under licensing agreement with the designer, Pelton Division of the Baldwin-Lima-Hamilton Corporation, the new rubber seated valves are trade-named Darling-Pelton Butterfly Valves and have been laboratory and field tested by both the Pelton and Darling organizations.

Advantages claimed for this new type of butterfly valve include lower operating torque, adjustability of seat for tight shut-off, seat replacement without removal of shaft or operator, elimination of shaft sealing problems as the rubber seat is a continuous ring integral with the disc, and increased operating cycles before part replacement or maintenance is necessary.

The line of Darling-Pelton Butterfly valves extends from 4 inch to 72 inch sizes for pressures in the 50 to 250 psi range. The valves are designed for all types of manual and air or hydraulic cylinder operation.

(This item supplements Darling Valve & Manufacturing Co. data on Pages 113-120 of the Pipe Line Composite Catalog, 1st Edition.)

For more data, circle **No. E12** on Readers' Service Card, last page this issue.

Density-Gravity Control

The JSP-173A, designed and manufactured by Instruments, Inc., is a new concept in controlling density and gravity of any fluid passing through a pipe either vertically or horizontally.

A novel feature is that no part of the equipment comes in contact with the product so that it cannot be affected by even the most corrosive materials. It requires no drilling of holes or welding of brackets and can be easily removed for use in another location when desired. The JSP eliminates sampling.

Originally developed in cooperation with the Atomic Energy Commission, this type of equipment has been used on government projects for several years. When used with a Recorder, it will indicate changes in gravity, interface level of different materials, and solids content in liquids from 1 to 25 percent.

Recording and controlling devices can be located up to 2000 feet from the material gaging point. Since there are no moving parts in the JSP-173A equipment, long periods of trouble-free operation can be assured.

For more data, circle **No. E13** on Readers' Service Card, last page this issue.

DE LAVAL

CENTRIFUGAL COMPRESSORS

on the job at El Paso Natural Gas

De Laval centrifugal compressors offer many important engineering features. (1) They are designed to handle an increased ultimate flow, can be quickly converted to larger capacities by replacing the impeller, diaphragm and a few minor parts. (2) The high pressure shaft seal eliminates leakage, consumption of sealing oil is negligible. (3) There is only one moving part—the rotor—which has ample clearance. (4) Units are compact, require smaller foundations and smaller stations. (5) First costs and installation costs are low.

Bulletin 503 gives data on De Laval Centrifugal Compressors. Write for your copy.

DE LAVAL *Centrifugal Compressors*

DE LAVAL STEAM TURBINE COMPANY

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DL375

STEEL GRIT Makes the Difference!

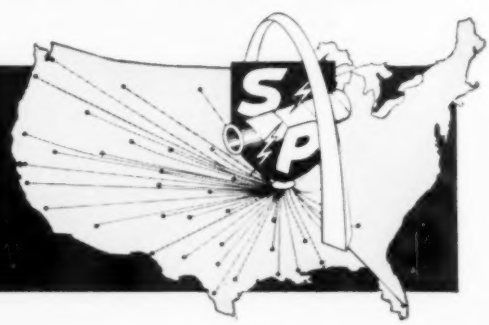
This steel grit with its sharp edges is hurled at very high speed against the rotating pipe, thereby removing every trace of dirt, mill scale and rust. In addition, the steel grit forms many tiny facets on the surface of the pipe. When the primer is immediately applied to the roughened surface of the warm pipe, the strongest bond possible is achieved.

Other methods of cleaning are less efficient and leave a semi-polished surface on the pipe, resulting in weaker bond.

Steel grit cleaning is the first very important step in obtaining the strongest bond of coatings and wrappings. At Standard Pipeprotection Inc., every piece of pipe is steel grit cleaned.

REMEMBER . . . YOU CAN JEEP ENAMEL, BUT YOU CAN'T JEEP BOND.

THROUGH FREIGHT RATES AT THE ST. LOUIS GATEWAY



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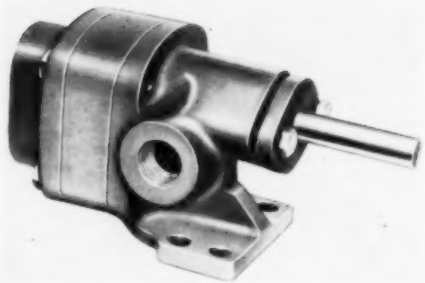


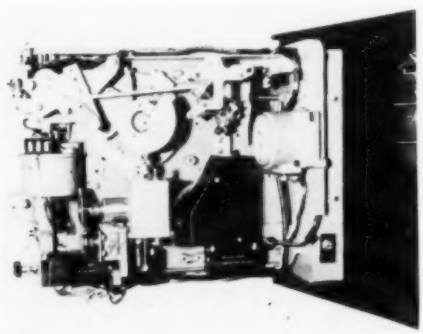
High-Pressure Pump

Worthington Corporation announces a new heavy-duty rotary pump line designed to meet the demand of industry for an efficient, economical, high-pressure pump. Available in sizes 1 through 4, the new herringbone gear rotary pump is applicable for oil burner service, high-pressure coolant service, small hydraulic systems, hydraulic lifts, filtration system and circulation service and any other application requiring a low cost heavy duty pump for continuous service at pressures to 500 psi in capacities to 25 gpm.

The new pump has suction and discharge openings from ½-inch N.P.T. to 1-inch N.P.T. and its simple, but rugged construction incorporates few operating parts for trouble-free service with minimum maintenance.

(This item supplements Worthington Corp. data on Pages 485-488 of the Pipe Line Composite Catalog, 1st Edition.)

For more data, circle **No. E14** on Readers' Service Card, last page this issue.

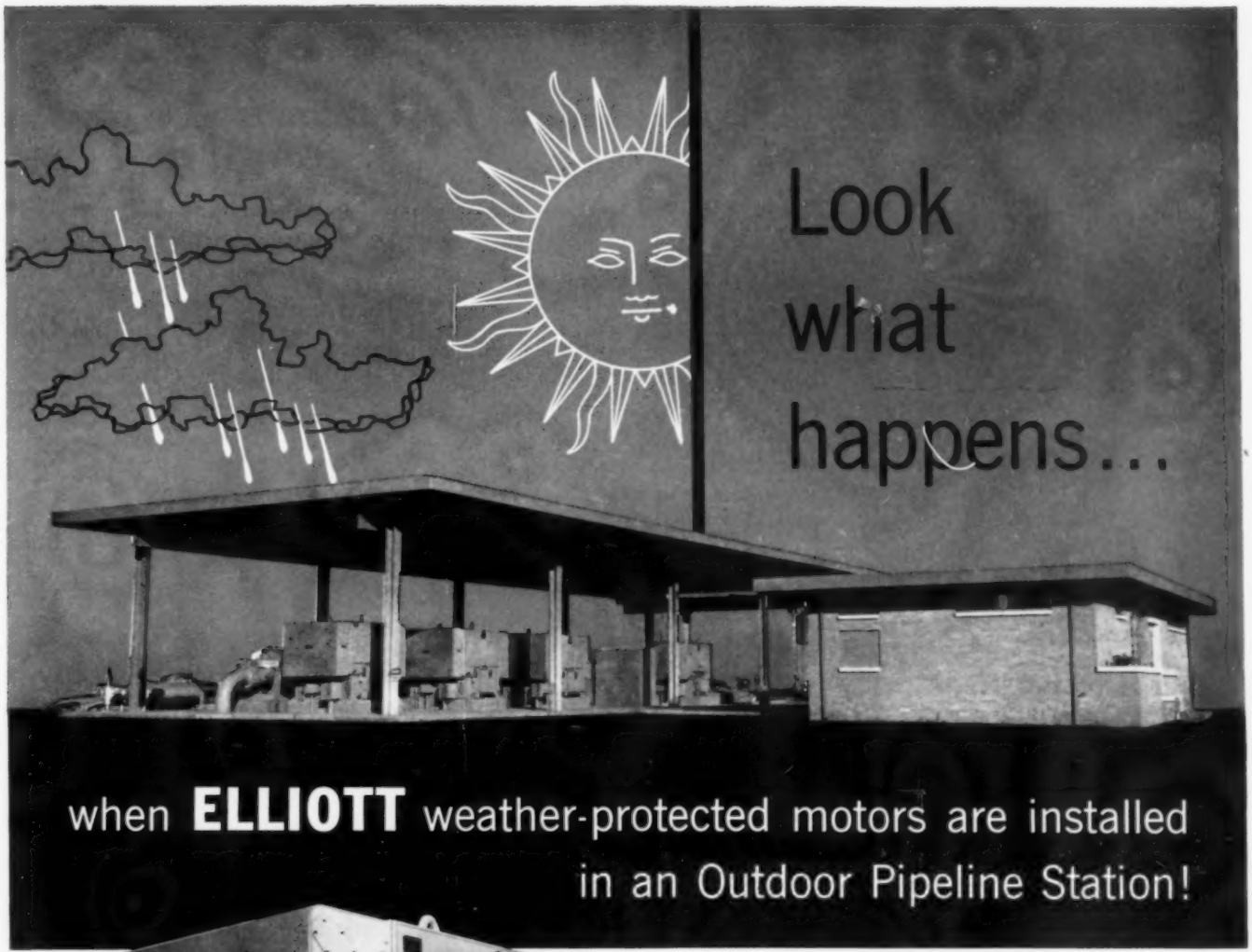


Ball and Disc Integrators

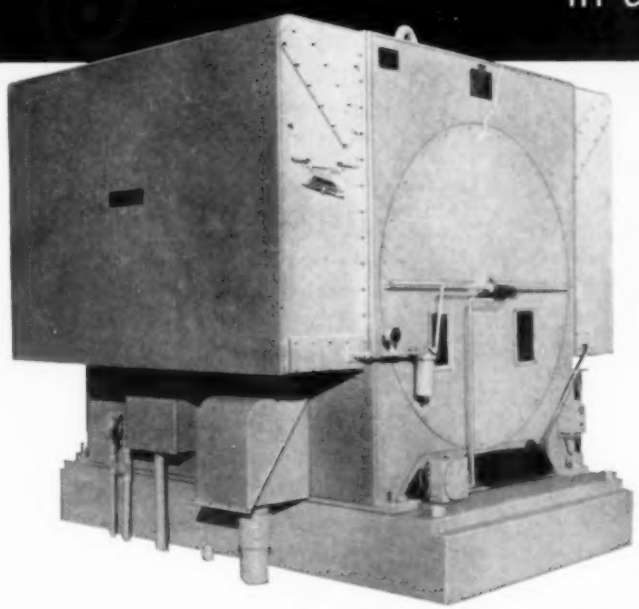
A far greater number of read out methods on strip chart recorders has now been made possible by Royson Engineering Co. with the adaptation of ball and disc integrators to the recorders.

For integrating against time, a synchronous motor is provided and to integrate against inches the chart drive itself is used. A few of the many read out methods that can be employed include use of a visual counter operated from electrical pulses obtained from output contacts, with the manual reset mounted in any number of convenient positions: use of a model RI-4 Royson Identichart, printing in digital form on the chart of the same recorder; and conversion of electrical pulses into pips along the edge of the chart with a special marginal pen assembly provided to draw every tenth pip in the opposite direction.

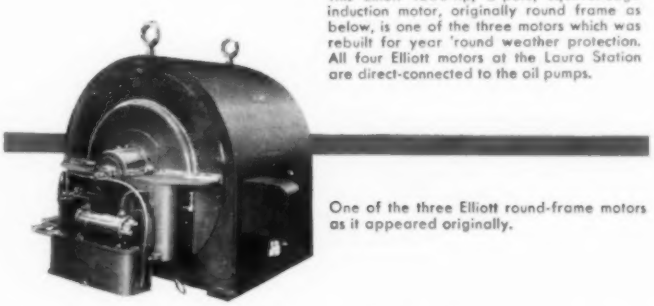
Many other variations can also be designed to satisfy special requirements. Field and shop installation can be handled for most Brown and other makes of recorder models with kits supplied by Royson. For more data, circle **No. E15** on Readers' Service Card, last page this issue.



when **ELLIOTT** weather-protected motors are installed in an Outdoor Pipeline Station!



This Elliott 1250-hp, 2-pole, squirrel-cage induction motor, originally round frame as below, is one of the three motors which was rebuilt for year 'round weather protection. All four Elliott motors at the Laura Station are direct-connected to the oil pumps.



One of the three Elliott round-frame motors as it appeared originally.

Costs Are Slashed. The outdoor structure costs far less and maintenance as well as year 'round operating costs are reduced. Besides that, Elliott motors are especially designed for safe, dependable, trouble-free operation *in all kinds of weather.*

Take the case of the Service Pipeline Company in Illinois. Rebuilding the above Laura Station as an outdoor facility, this company installed four Elliott weather-protected squirrel-cage induction motors. The station includes a canopy which gives extra protection from rain and sun—added insurance against the possibility of direct sunlight tripping the thermal devices, and provides a chain hoist for maintenance. Both the concrete slab area and the canopy extend far enough to provide ample working space around pumping units.

Three of the four motors, originally dripproof round-frame, were rebuilt to weather-protected designs—resulting in additional savings. Windings were given added treatment by immersing coil ends and baking. Explosion-proof bearing temperature and oil pressure relays were provided to assure maximum safety for operation in a hazardous atmosphere. These and other features of the Elliott weather-protected motors permit the erection of simplified outdoor stations instead of more costly enclosed housings. For further details, call your nearby Elliott District Office or write . . .

ELLIOTT Company

Ridgway Division • Ridgway, Pa.

R7-1

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P. O. BOX 276-K
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REDUCERS: Concentric and eccentric. Nominal pipe sizes 1" to 30", ASA B16.9, ASTM A234. Schedules 10 to 160, stainless steel, and other alloys. Special lengths and sizes.

SADDLES: Conventional, and for pressure vessel heads. Nozzle sizes from ¼" to 24". Fleet-Line saddles weld neatly into place in much less time, and with much less welding rod.

Complete encirclement saddles.

Fast interested service.
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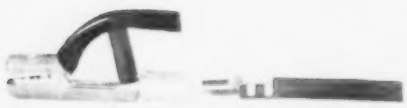
P. O. Box 276K • Shreveport, La.

No. 10-P Prong Type

No. 20-B Pressure Bar Type



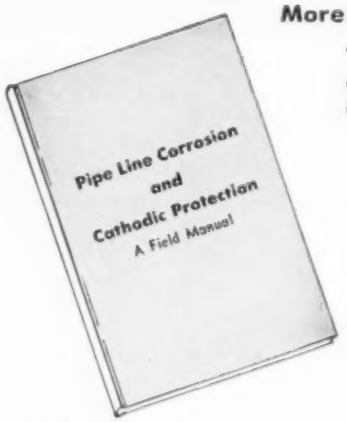
Cable Connection Support installed on cable and ready to be inserted into holder socket.

Cable Connection Support in place after the connection has been made.

Cable Support

Tweco Products, Inc., has announced the manufacture of the Tweco Cable Connection Support. This formed steel clamp anchors in the electrode holder connection socket and then extends back to encircle and grip the rubber jacket of the cable behind the bare strands. The bridging effect of the Connection Support, from the holder body to the jacket of the cable, stops the flexing of the bare strands behind the holder connection and stops strand breakage at this point. Tweco Connection Supports are made of steel and are zinc plated. Available in two types; the No. 10-P Prong Type fits all Tweco Holders, the No. 20-B Pressure Bar Type fits all other holders that use two Allen screws and a pressure bar.

For more data, circle **No. E16** on Readers' Service Card, last page this issue.



More comments on this new Handbook:

"... a most practical on-the-job manual for men concerned with pipe line corrosion. We are ordering copies for each of our district engineers."

Pipe Line Corrosion and Cathodic Protection

By MARSHALL E. PARKER

This Handbook, written by Marshall E. Parker, consultant, is designed as a practical field manual. It is a 108-page pocket-size volume printed first as a popular series in WORLD OIL. The Handbook is illustrated with many charts and drawings and is completely indexed by subjects.

It presents comprehensive data on Soil Resistivity Surveys, Potential Surveys, Line Currents, Current Requirements, Rectifier Systems, Ground Bed Design, Magnesium Anodes, Stray Current Electrolysis, Interference in Protective Systems, Operations and Maintenance, and Coating Protection and Testing.

An appendix has been added of technical data on Underground Corrosion, Basic Principles of Cathodic Protection, Properties of Metals and Attenuation Equations. Order copies of this practical Field Manual now for each of your field men. Price $3.

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FINAL DRIVE SEALS

DOUBLE PROTECTION

For Caterpillar D-9 Tractors

Final drive on Caterpillar D-9 tractors are double-protected against damage from loss of lubricant with new Sure-Seals. Even if the outer bellows seal is broken, the oil can't leak out due to the exclusive "O" ring (1) inner seal—dirt, water, foreign matter can't get in.

Other Sure-Seal features: Equal pressure springs (2) are self-aligning and exert proper pressure for effective seal without undue friction. Flexible, oil-resistant bellows (3) is ribbed for extra wear resistance and strength. Rubber grommets (4) on locating pins hold seal in place while installing.

Sure-Seal Final Drive Seals also made for D-4, D-6, D-7 and D-8 tractors.

Sure-Seal® ROLLER SEALS

Has Chevron inner seal (1) to give double protection to rollers on Caterpillar and International Harvester tractors. High pressure lubrication can't blow out bellows seal. Keeps lubricant in—dirt and water out. Also has heat-resistant leather facing (2), self-aligning, equal-pressure springs (3), flexible oil-resistant bellows (4).

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Sure-Seal® Equipment Co.

1820 N.W. 25th Ave. Portland 10, Oregon

So SIMPLE
We Can
Adapt It
to ANY
LIQUID LEVEL
CONTROL JOB
A sleeve, raised and lowered within a non-magnetic tube, attracts or releases an Alnico magnet attached to a mercury switch. Basically, this is Magnetrol.
MAGNETROL

AS DEPENDABLE AS MAGNETIC FORCE ITSELF

● No matter how specialized the liquid level control application, adapting Magnetrol to meet it presents no problem. Whether it's for high pressures, high temperatures, corrosive liquids or any other condition, a few "standard" modifications and the job is done! Operation is so simple no changes in basic design are needed. That's why Magnetrol "fits" practically any application—why "specials" are so often standard with us.

Because of the utter simplicity and dependability of its magnetic principle, Magnetrol has *infinite operating life.* There are no wearing parts to get out of order.

Magnetrols are available for controlling level changes from .0025-in. to 150-ft., with single or multi-stage switching. Our experienced engineering staff is at your service.

MAGNETROL, Inc.

WHY NOT MAIL THE COUPON—NOW

Magnetrol, Inc., 2128 S. Marshall Blvd., Chicago 23, Illinois
Please send me catalog data and full information on Magnetrol Liquid Level Controls. 7

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Company_____
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PIPELINER WINS THE BATTLE OF THE MOJAVE DESERT

Unexpected rock. High winds. Rivers. Mountains. Sand. R. H. Fulton overcame them all with the help of its Caterpillar spread.

NEW CATERPILLAR NO. 572 PIPELAYER, left, teams up with No. 583 and the MDW8, lowering in on the Mojave Desert. The new No. 572 has a capacity of 86,000 pounds with a 19-inch ground clearance and 86-inch track gauge to give stability.

D9 WITH KELLY RIPPER (left) prerips unexpected rocky soil for ditcher. The Cleveland Ditcher (right) which follows is powered by a dependable Cat D339 Engine. The ditcher is cutting a depth of 65 inches at about 28 feet per minute.

NATURE put R. H. Fulton & Co. to the test during a 241-mile natural gas pipeline job across the Mojave Desert from Needles to Newhall, Calif.

Rock cropped up unexpectedly. Unseasonable high winds held up welding and painting, at times backfilled the ditch. Sand made maintenance of a firm ditch difficult. There were three river crossings and rugged mountainous terrain. But Fulton, with the help of its big Caterpillar spreads, overcame each obstacle, lowering in an average of 5,000 to 6,000 feet a day with a one-day high of 16,000 feet.

The 30-inch line is part of a $33.5 million joint expansion program of Southern California and Southern Counties Gas Companies. It will provide an additional 227.6 million cubic feet of gas per day.

Here are some of the problems Fulton encountered and how they were overcome:

ROCK—This occurred in stretches of presumably sandy material from 9 to 24 inches below the surface. By using huge Kelly Rippers mounted on the giants of the spread—CAT* D9 Tractors—a great deal of shooting was eliminated. The D9-Kelly Ripper combination preripped the rocky soil for the ditcher.

Because of danger of rock damage to pipe in backfilling, the entire length is padded on the bottom of the ditch and top of the pipe. Two Cat No. 977 Traxcavators* and a Crosse Ditch Padder side-mounted on a D8 were used for the padding operation. A D7, working with a No. 12 Motor Grader, backfilled.

WIND—Unseasonable high winds backfilled the ditch and periodically stopped welding and painting operation. But welding crews set a brisk pace in spite of the winds. Using Caterpillar* Twin Arc-Welders on Athey track wagons pulled by a D7, their best day was 16,200 feet.

MOUNTAINOUS TERRAIN—Rugged Kane Springs Canyon and the Ord Mountains had to be crossed. A D8 and D9 were used to winch a Northwest Backhoe over the steep canyon grade. Later, D9s towed stringing trucks in and out of the mountainous area.

Altogether, Fulton had almost 70 Caterpillar track-type Tractors and Pipelayers at work. In addition there were five Twin Arc-Welders, and dependable Caterpillar Diesel Engines powered cranes, backhoes and ditchers.

When it comes to the tough jobs, pipeliners know there is only one make of equipment designed to produce wherever the pipe takes them. That's why the standard color in fast-moving spreads throughout the world is Caterpillar yellow.

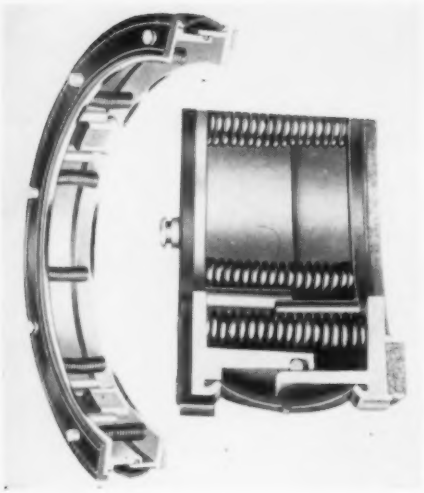
CAT TWIN ARC-WELDERS, mounted on Athey track wagons and pulled by a D7, helped make up for time lost due to high winds in the desert. Best day: 16,200 feet.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS, U. S. A.

*Caterpillar, Cat and Traxcavator are Registered Trademarks of Caterpillar Tractor Co.

New Equipment Literature

For more data on New Equipment or copies of Catalogs and Literature reviewed in this issue, use the Reader Service postcards just inside the back cover and facing the Advertisers Index. Simply circle code numbers of items desired—sign and mail card.



Lubricant Seal

An improved lubricant seal for the final drive on Caterpillar D-9 tractors is now available.

Called Sure-Seal, it offers double protection against lubricant loss from the final drive. As well as the conventional outer rubber bellows seal, there is an inner seal consisting of a rubber O-ring which rides between metal flanges.

This inner seal retains lubricant even though the outer bellows seal is ruptured. Sure-Seal also prevents dirt, water from entering the final drive.

(This item supplements Caterpillar Tractor Co. data on Pages 67-69 of the Pipe Line Composite Catalog, 1st Edition.)

For more data, circle **No. E17** on Readers' Service Card, last page this issue.

Vertical Motors

Literature has been released describing vertical weather-protected motors with enclosures built to NEMA Type II standard now available from Allis-Chalmers in squirrel-cage and wound-rotor induction and synchronous types in ratings of 250 horsepower and up.

Designed for outdoor applications on pumps and other vertical drives, the new motors' ventilating passages are constructed to minimize the entrance of rain, snow and airborne particles with baffles to direct the flow of air in and out. Intake and exhaust openings to air chambers are arranged so high velocity air blown into the machine will circulate through and be discharged without entering the internal vent passages leading to electric parts.

To get a copy, circle **No. E18** on Readers' Service Card, last page this issue.

Coatings

The advantages of halofluorocarbon dispersion coatings for industrial corrosion control and contamination prevention are described in a four-page booklet on Minnesota Mining and Manufacturing Company's "Kel-F" brand dispersion coating system. The publication gives explanations concerning which materials can be coated with "Kel-F" dispersions, the combination of properties offered by this system and the methods of applying the dispersions.

To get a copy, circle **No. E19** on Readers' Service Card, last page this issue.

Wrenches

Lowell Wrench Company has recently made available a compact Lowell Wrench catalog with complete information for ordering Lowell Reversible Ratchet gear and socket wrenches. Full specifications and details are given for the many types of wrenches. It also includes information on special wrenches and a time-saving table for determining quickly the correct size wrench to fit any bolt or nut diameter.

To get a copy, circle **No. E20** on Readers' Service Card, last page this issue.

Dust Collector

A new product bulletin describing the Type W Roto-Clone, a dynamic precipitator, has been released by American Air Filter Co., Inc. The 16-page bulletin discusses the operation of the Type W Roto-Clone dust collector in detail and includes explanations of various arrangements. The bulletin explains the Type W's distinguishing feature, the addition of a water spray to the basic principle of dynamic precipitation. Wiring diagrams, performance tables, drawings and other engineering data are also included.

To get a copy, circle **No. E21** on Readers' Service Card, last page this issue.

Carbureted Units

A graphically-illustrated 12-page catalog on its line of six new and increased horsepower six-cylinder carbureted power units has been announced by International Harvester Company. The booklet describes each of the six recently introduced units which are presented with handy power and fuel consumption curves. An eight-page catalog on the increased horsepower line of four-cylinder carbureted power units is also available.

To get a copy, circle **No. E22** on Readers' Service Card, last page this issue.

Movie About Laying Pipe

How the problems of laying a pipe line in rocky country are conquered is told in a new movie, "Overland Underground," produced by the Gardner-Denver Co.

The 19-minute sound film in color tells the story of men and machines battling the unusual terrain found in the pipe line's path between Ignacio, Colo. and Moab, Utah. Surface rock along this 160-mile stretch of the line makes special construction techniques on the part of the building crews necessary.

To get a copy, circle **No. E23** on Readers' Service Card, last page this issue.

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Ounces Only Once a Week
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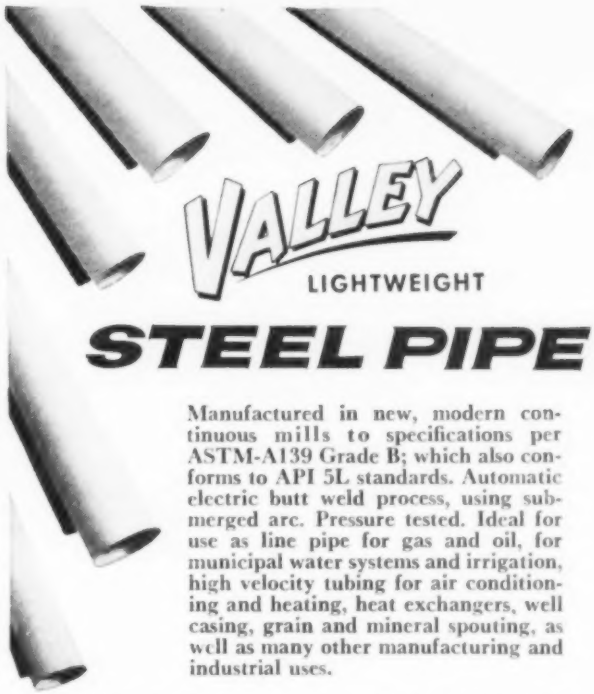

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Available in 6", 6⅝", 8", 8⅝", 10", 10¾" diameters, from 16 gauge up to and including .188 wall thickness; 20, 30 or 40-foot lengths; and in plain or belled ends. Quotations available for Victaulic or Dresser end processing, and coating.

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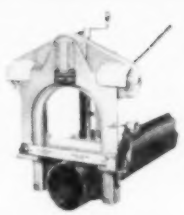
POWER AND MANUAL PIPE CUTTERS
2" TO 72" CAPACITY



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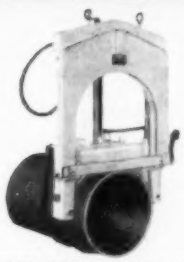

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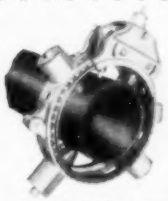
"The milling machine on wheels"
Cuts 10" to 72" Pipe



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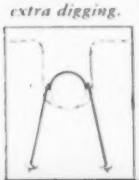
Chance Pipe Line Screw Anchors can be installed in pipe line ditches without extra digging. Using a power wrench the operator merely guides the anchor in place. The tool does the work.

Can be installed in the ditch without extra digging.



Write for catalog showing oil industry applications of Chance Earth Anchors.

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QUICKLY—PERMANENTLY

SKINNER-SEAL PIPE JOINT CLAMPS stop leaks at joints. Put on under pressure—without interruption of service. Quick, simple lasting repair. Sizes 1/2" to 24" incl. in stock.

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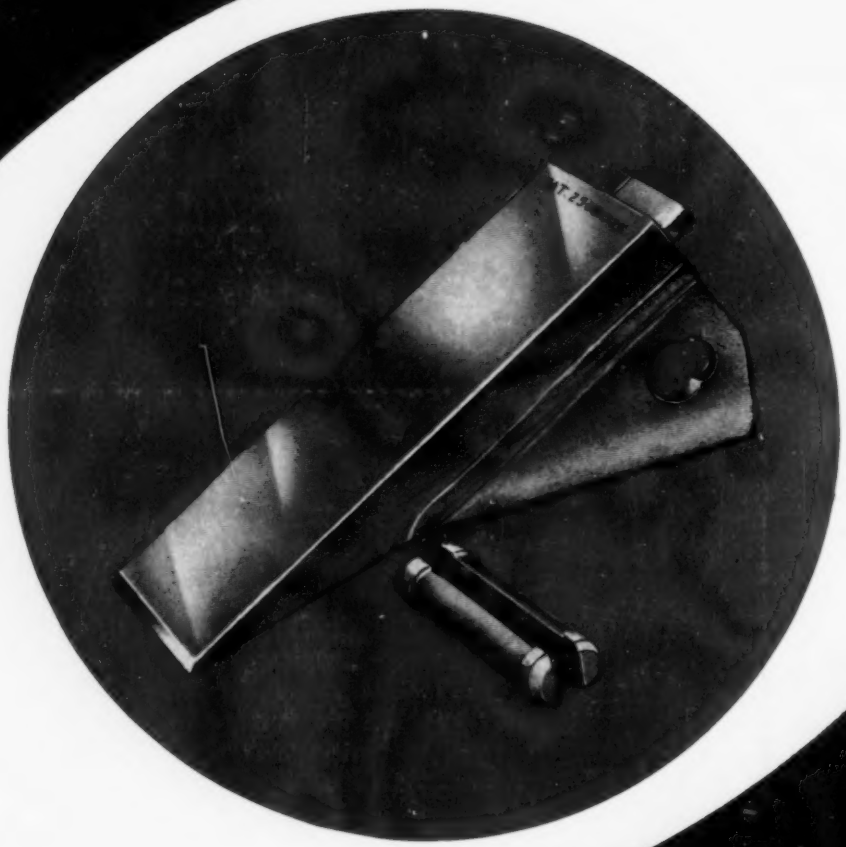

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